58
16

ELECTRICAL REVIEW

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21 APRIL 1961

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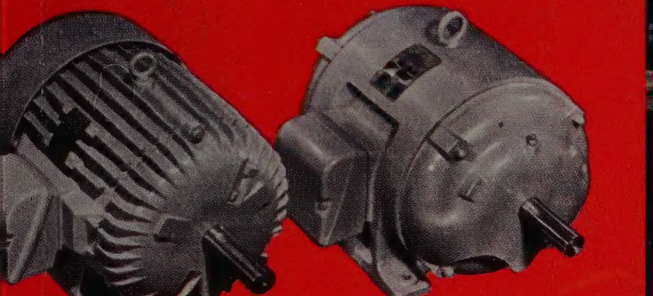
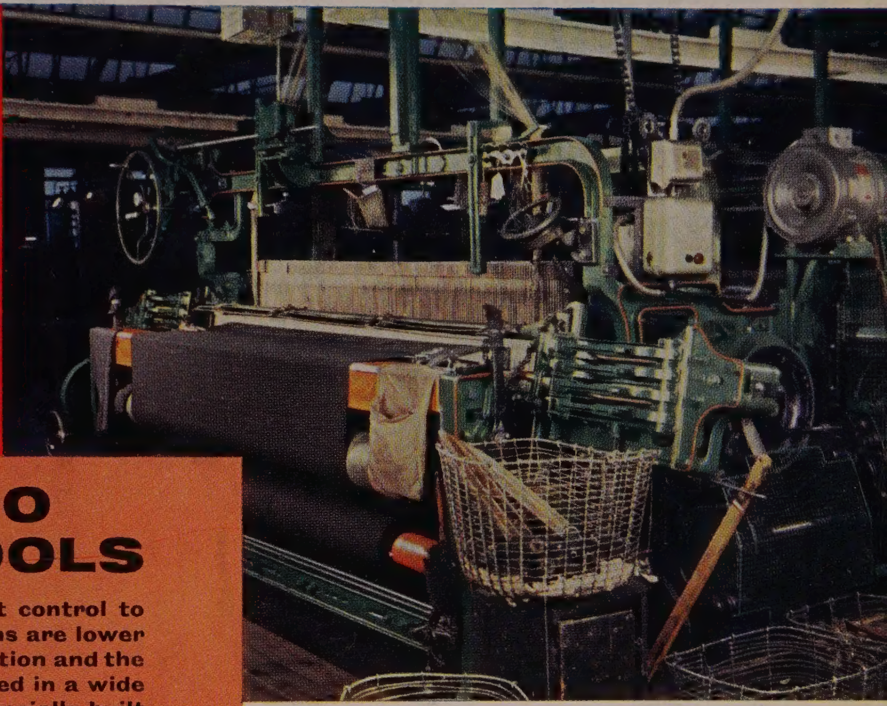


'D' Type Totally Enclosed Fan Cooled Motors and 'C' Type Ventilated Motors — now interchangeable for frame size and dimensions.



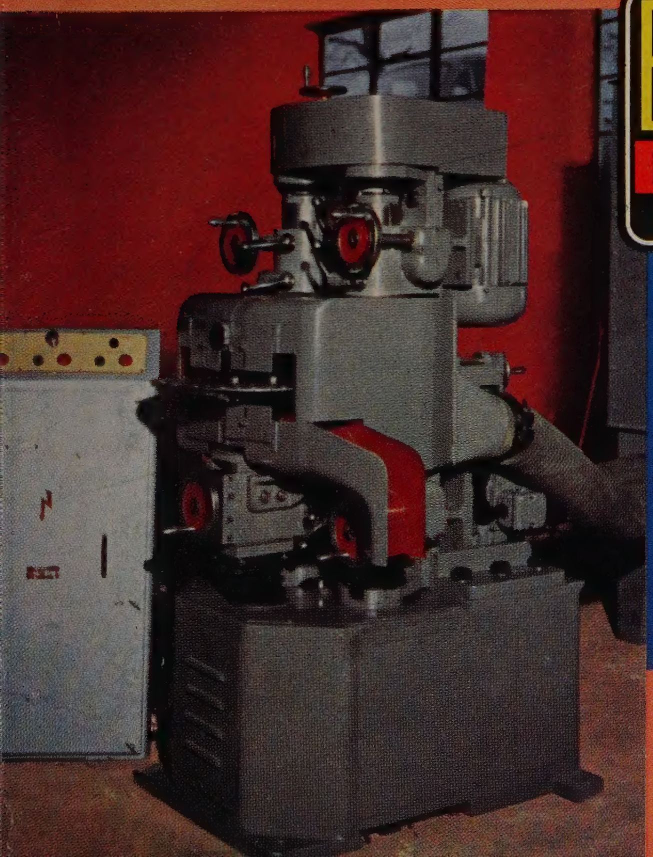
FINE TEXTILES TO FINE MACHINE TOOLS

Brook products bring reliable power and efficient control to every industrial application. Current motor designs are lower in cost resulting from new developments in production and the use of better materials. Control gear can be supplied in a wide variety of standard types or large panels can be specially built for individual needs.

BROOK ELECTRIC MOTORS

$\frac{1}{25}$th. to 600 Horse Power

29



Brook Standard Starters for Direct Switching — Star Delta — Stator/Rotor — Reversing — Multi-Speed; plus a comprehensive range of limit switches — push button stations etc.

BROOK MOTORS LTD
Huddersfield

'Sky-Line'...in single, elegant fittings or coupled in flowing lines for hotels, stores, supermarkets, offices and all commercial areas.

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Smee's 162

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AUTOMATION

and greater

EFFICIENCY

are the orders

of the day

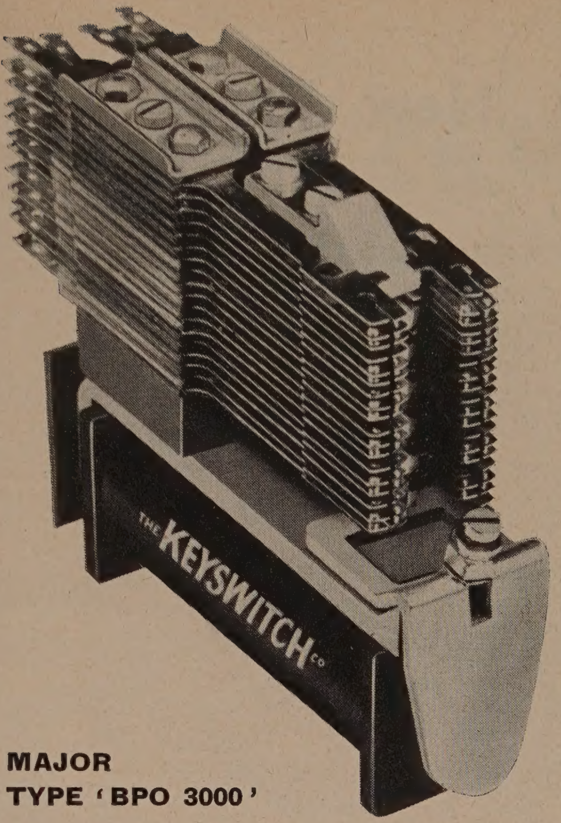
there are

KEYSWITCH relays

—abreast and

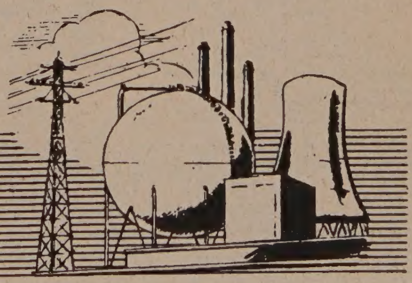
ahead of latest

developments



MAJOR
TYPE ‘BPO 3000’

The best known and most useful relay available. Spring sets allow from one make or break to 12 changeovers. For minute or heavy switching. Sensitivity down to 20 milliwatts. Adjustable for critical timing, fast or slow operation. Standard or Tropical finish. Special adaptations can be supplied. Transparent covers are available.



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RELAYS

FOR ALL PURPOSES

Manufactured as required for customers' own applications in :

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- AUTO-TIMING and AUTOMATIC SIGNALS
- TELEPHONE and INTERCOM SYSTEMS
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- CURRENT and VOLTAGE REGULATION, etc.

A unique Calculator providing full Relay Specifications is available FREE on request.

Extremely advantageous quotations can be offered for quantity orders.

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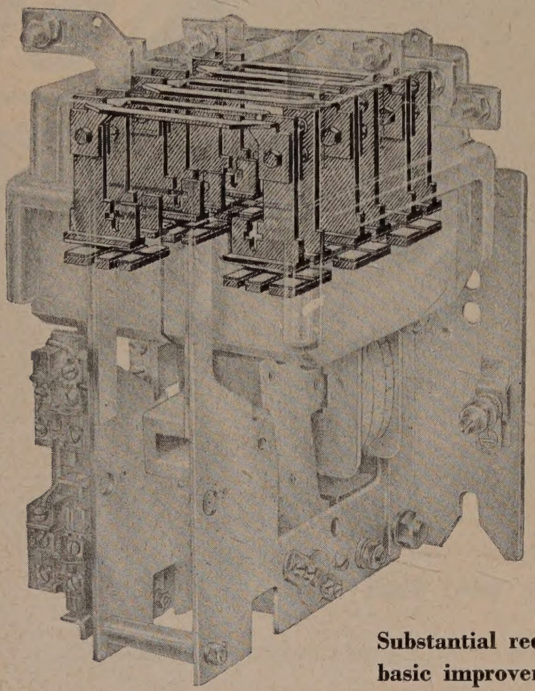
Telephone: PADdington 2231 PBX

CONTRACTORS TO HOME AND OVERSEAS GOVERNMENTS AND H.M. CROWN AGENTS

A New Philosophy in Motor Control



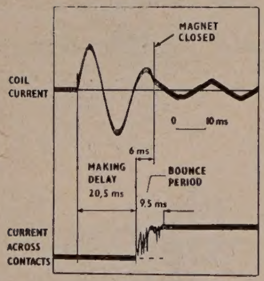
World famous quadruple breaking, bounceless making contactor for 10 Millions of trouble free operations without maintenance or replacement of contacts.

Rapidly progressing automation and mechanization demand constantly better quality and higher dependability of electrical motor controls. The frequency of operations is increasing steadily. Down time becomes more expensive every day. These tendencies have been guiding factors in the process of developing our magnetic contactors. The most important requirement was to reconcile the life span of the contacts with that of the mechanical structure and to get both up to a level that assures many years of maintenance-free service. These contactors are the heart of many KME starters which have shockproof, dust-tight, splashproof and breakproof enclosures. Standard Starters are stocked in our branch warehouses, custom made starters and motor control centres are assembled in our branch workshops. So you have all service facilities at your fingertips.

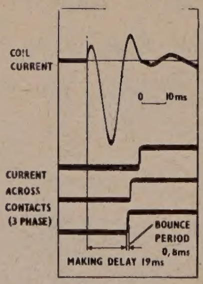
Substantial reduction of contact wear has been achieved mainly by two basic improvements :

Reduction of Making Contact Wear

Comparative oscillograms showing making of contacts.



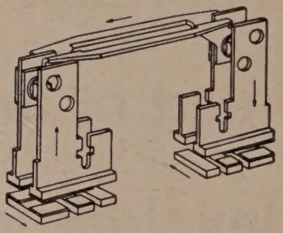
Oscillogram of a contactor with relatively long Bounce Period.



Oscillogram of our Contactor DIL 8, showing almost bounceless making of contacts.

A minimum weight of the movable contacts, consistent with optimum speed on making, has been established which results in a remarkable reduction of contact bouncing.

Reduction of Breaking Contact Wear



Simplified sketch of the contact system with four breaks per phase.

Reducing wear on breaking requires the prevention of re-ignition after passing through zero for the first time. The conventional method of applying two breaks per phase, however, does not accomplish this satisfactorily above a certain current and voltage level. Consequently, we developed the principle of four breaks per phase. This positively prevents re-ignition even with high currents and voltages.

Use **KME CONTROLS** *and see the difference*

KLOCKNER-MOELLER ENGLAND LTD

for information write or telephone our nearest office

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CENTRAL 0274

2 Pritchett Street,
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ASTON CROSS 1167

Permanent House,
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LEEDS 30151

SULZER

BOILER FEED PUMPS AT NORTHFLEET

The illustration shows one of six 2600 H.P. main Feed Pumps for the Northfleet Power Station of the C.E.G.B.

Sulzer pumps have been adopted for most thermal and nuclear Boiler Feed duties, including advance class units for Supercritical Power Stations.

SULZER BROS. (LONDON) LTD.

31 BEDFORD SQUARE
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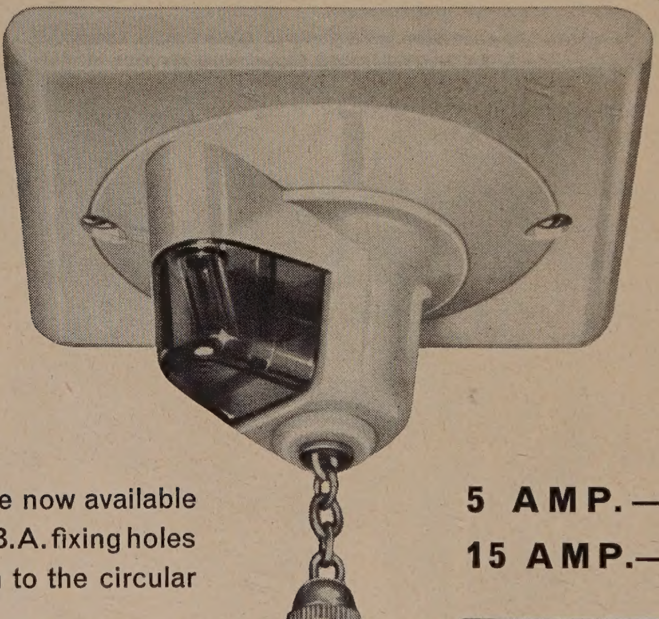
Incorporating
Hathorn Davy & Co. Ltd.

CEILING SWITCHES

SQUARE OR CIRCULAR

MK204DHB



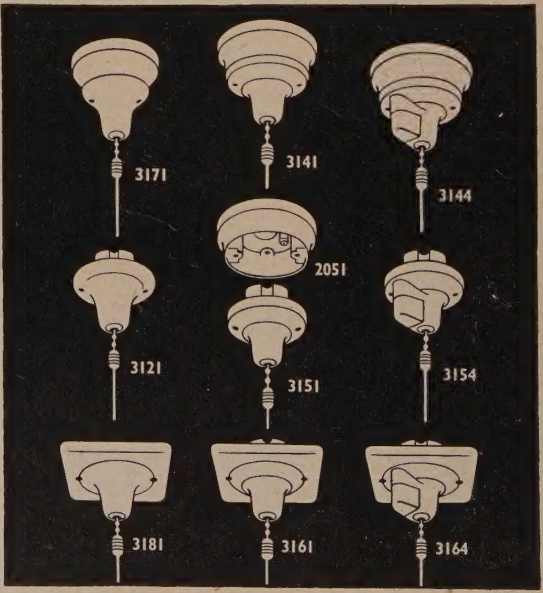
M.K. CEILING SWITCHES are now available with square flanges (two 4 B.A. fixing holes on 2$\frac{3}{8}$″ centres) in addition to the circular designs.

5 amp. Single Pole to B.S.2652 (one and two-way) or 15 amp. Double Pole (with or without neon indicators).

Square are suitable for flush mounting in boxes to B.S. 1299/1363 or can be surface mounted in moulded Conversion Box M.K. List No. 2030.

Circular have integral moulded blocks for surface mounting or can be without mounting blocks for small circular conduit boxes to B.S.31.

5 AMP.—SINGLE POLE
15 AMP.—DOUBLE POLE



M. K. ELECTRIC LIMITED SHRUBBERY ROAD EDMONTON LONDON N.9. EDMONTON 5151

Medium-size a.c. motors

FROM STOCK

IMMEDIATE DELIVERY

is offered of all the following foot-mounted induction motors. The ratings listed are for 400/440 volt, 3-phase, 50-cycle supplies.

SQUIRREL CAGE (BS 2613)

Screen-protected		Totally enclosed fan-cooled	
h.p.	*speed r.p.m.*	*h.p.*	*speed r.p.m.*
30	725	25	730
50	725	40	730
*55	720	50	1475
70	720	50	730
*75	970	†65	1475
100	1455	†65	975
100	725	†80	1465
*125	1465	†85	950
*130	970	100	1480
		†100	1450

SLIPRING (BS 2613)

Screen-protected	
h.p.	*speed r.p.m.*
30	965
50	1450

**drip-proof enclosure*

† *totally-enclosed closed air circuit motors, radiator cooled.*

For further details of these and other AEI stock motor ranges, please contact your local AEI district office or Industrial Machines Dept., Mosley Road Works, Trafford Park, Manchester 17. Telephone No. Trafford Park 2431. Extension 1212.

AEI Associated Electrical Industries Limited

MOTOR & CONTROL GEAR DIVISION RUGBY AND MANCHESTER ENGLAND

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(One of the Sheepbridge Engineering Group)

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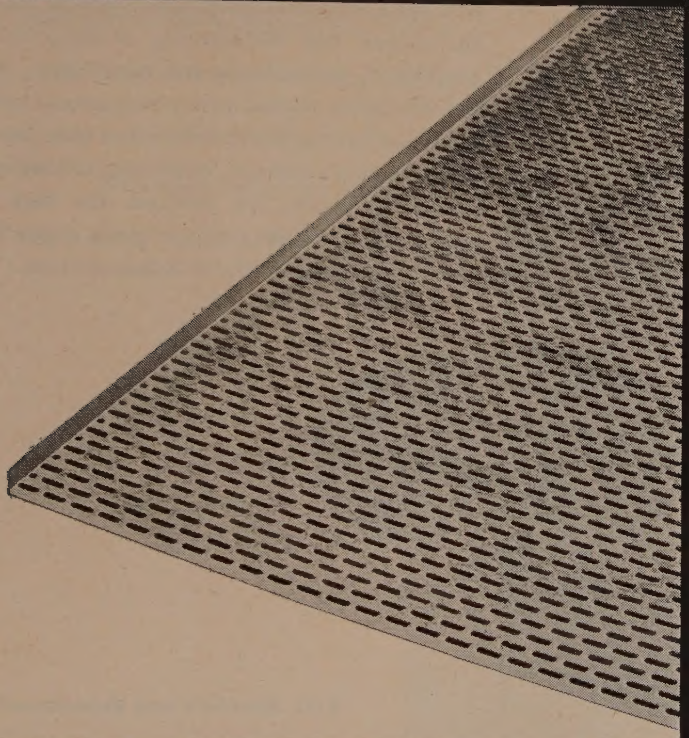
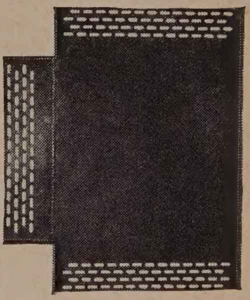
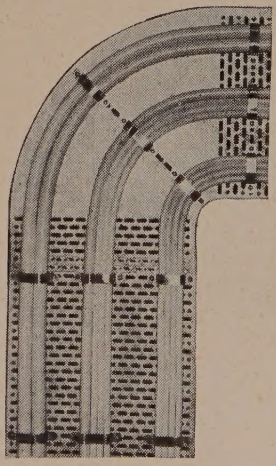
Cut installation costs

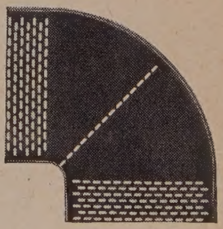
Braby

PERFORATED CABLE TRAYS









In today's go-ahead industries, the slow, complicated methods of yesterday have no place. Now, when cables need to be carried, modern Braby Trays answer all requirements ideally. They are easy to fit, take the least possible time to install, are permanent fixtures and reduce costs appreciably. The perforations save weight, facilitate handling and ensure adequate ventilation. Braby Perforated Cable Trays are obtainable in painted, self-coloured, galvanised or plastic-coated steel and in aluminium alloy. In widths from 2″ to 36″. Standard length 8 ft. Bends and tees also available. **Available from stock**

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in control

STC has a long established reputation in the field of the control and telemetering of electrical power generation, transmission and distribution, gas and water supplies, nuclear power stations and industrial processes; railway traffic control and train describers. The Company's systems, employing miniature push-button apparatus, are amongst the best in the industry and are the result of much research, planning and precision methods of manufacture.

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STC
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61/4R

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INSTRUMENTATION AND CONTROL DIVISION
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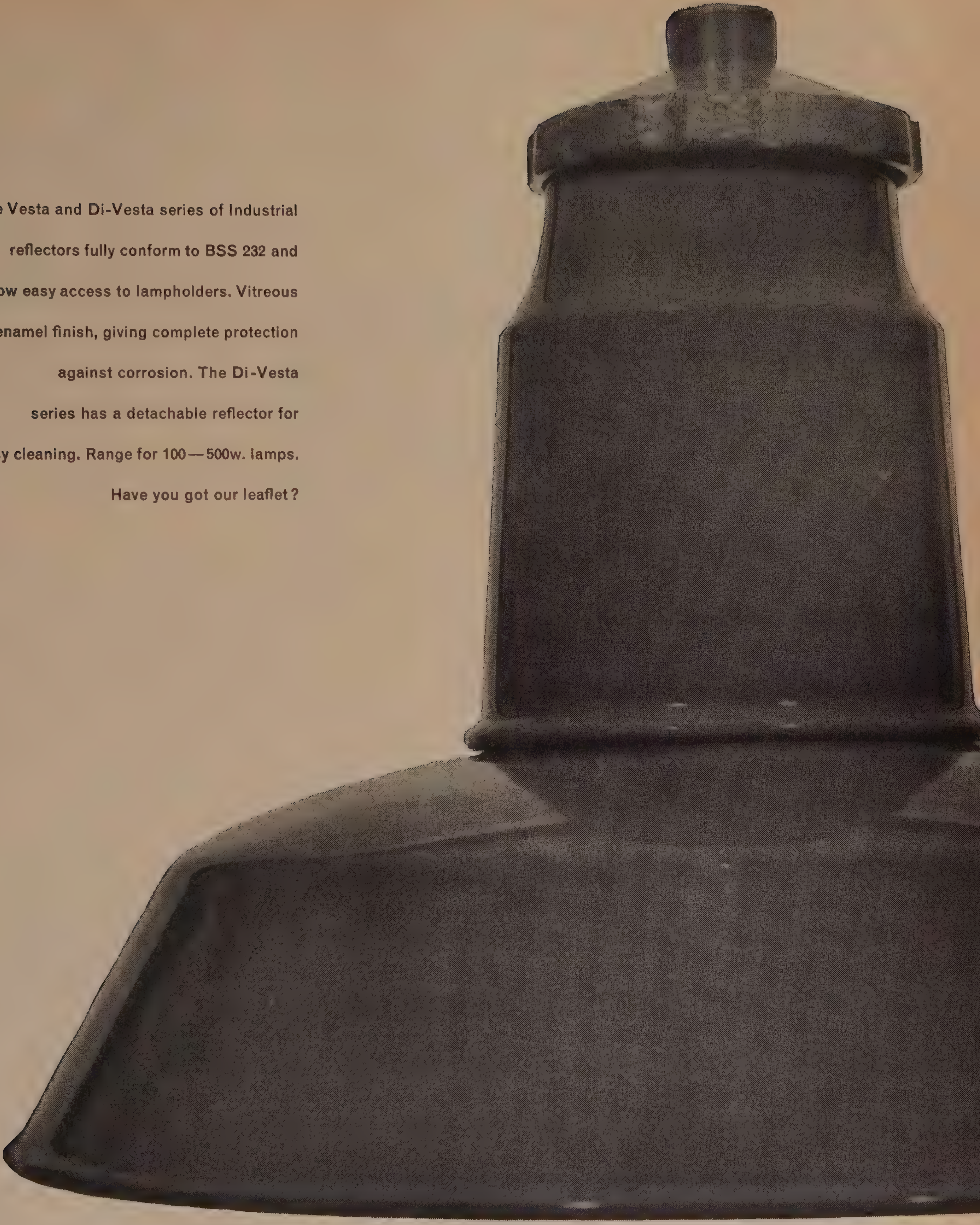

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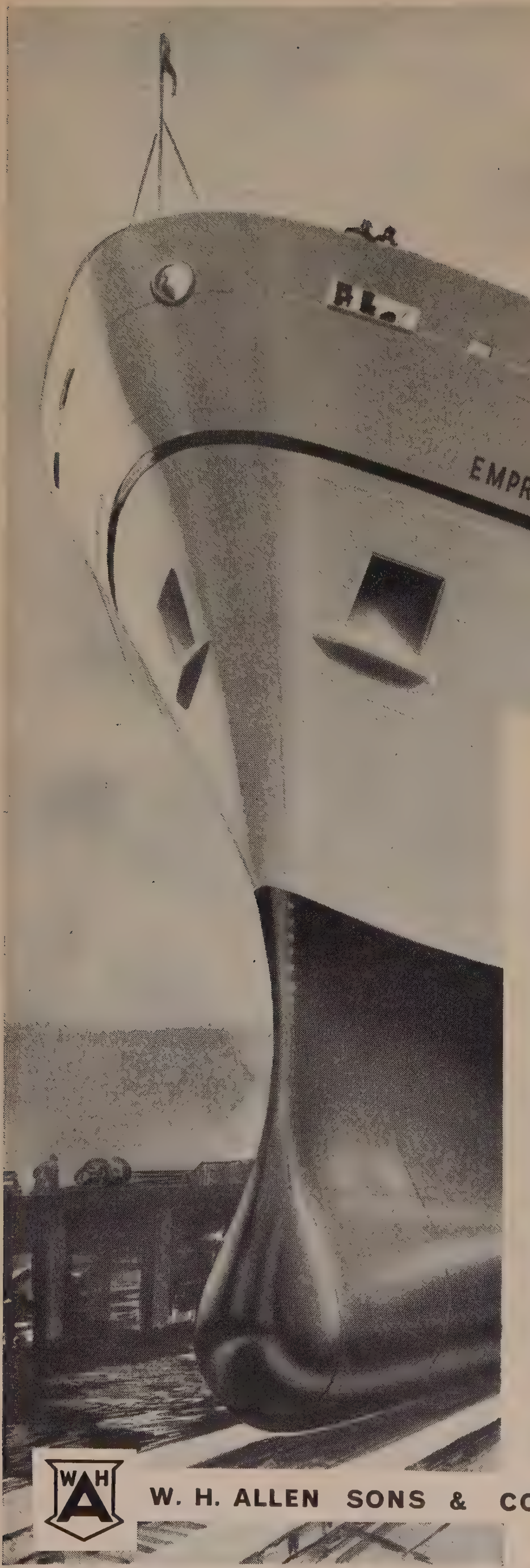
REVO ELECTRIC CO. LTD., TIPTON, STAFFORDSHIRE

A Duport Company famous for cookers, fires, fluorescent and industrial light fittings, power tools, street lighting, switch and fusegear etc.

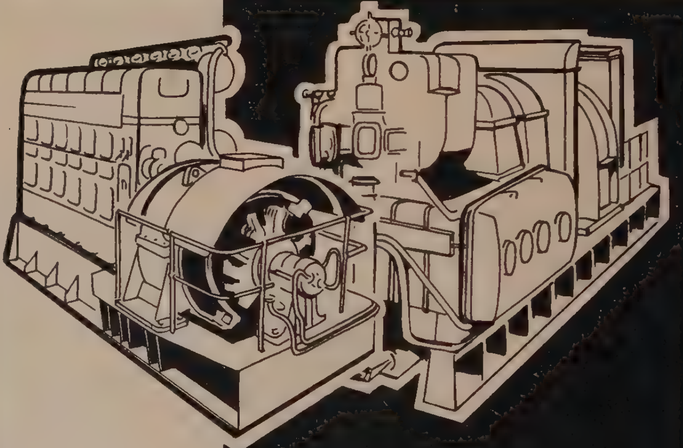
W & W



ALLEN generating plant for a new EMPRESS

Like her forerunners the 'Empress of Britain" and the "Empress of England", this new Canadian Pacific liner is equipped with Allen main generating plant supplying electricity for auxiliary power, lighting and other services. Installed aboard are two 1,500-kW Allen d.c. turbo-generators and three 500-kW Allen diesel-generator sets, together with a number of Allen motors driving stabilisers, compressors and pumps.

The "Empress of Canada" was built by Vickers-Armstrongs (Shipbuilders) Ltd.



ALLEN

W. H. ALLEN SONS & COMPANY LTD · BEDFORD · ENGLAND

things she's looked for – but never found till now...

dbye to meat shrinkage!
2. No more boiling over!
3. Joints done exactly to order!
4. Set it—leave it!
5. No need to open oven door!

things she's never dreamt of ...... till MOFFAT did!

s easy to sell a MOFFAT! Ask the stockists th crowded showrooms and bulging order oks . . . ask the wives who won't look at any her cooker but a MOFFAT!

ROTISS-O-MAT SPIT — *Self-basting seals in ces, flavour—stops shrinkage.*

THERM-O-GUARD *thermostatically controls any ucepan or Moffats' exclusive Deep Well Cooker ep Fat Fryer.*

ROAST METER — *Thrust thermometer probe into nt and dial preference (rare, medium, well done) Roast Meter does the rest.*

AUTOMATIC CLOCK *for absentee control of all oking operations.*

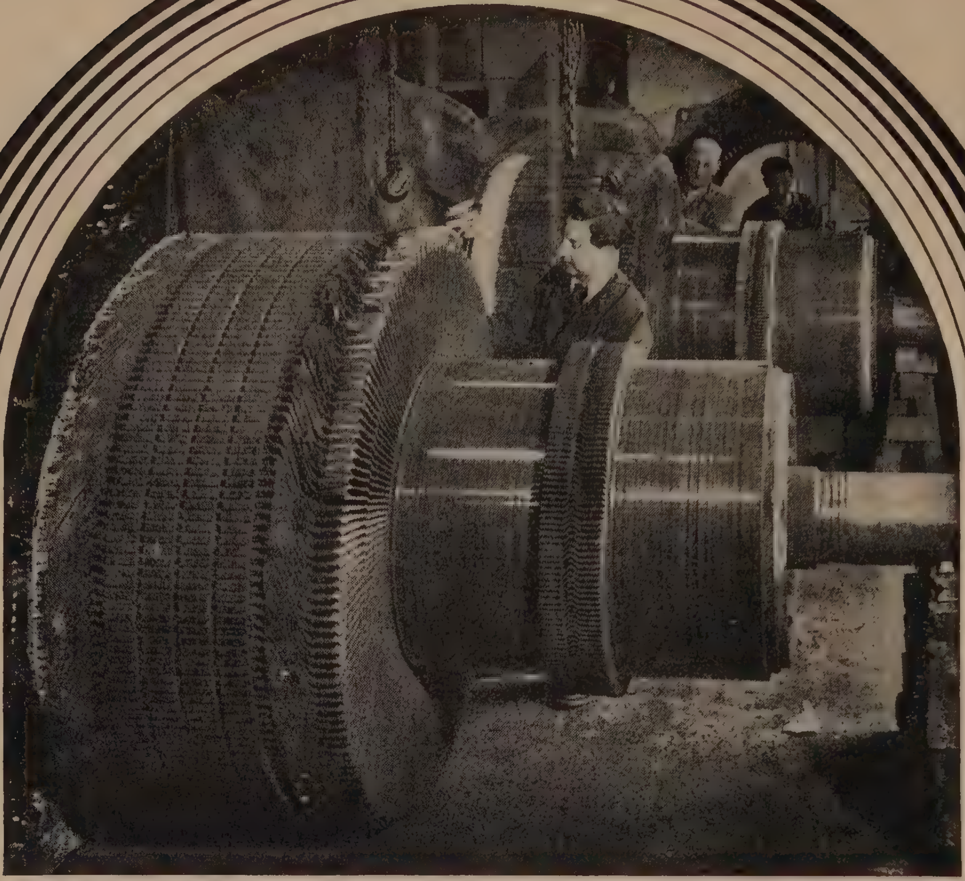
HI-LO-MATIC SHELF — *Raise or lower at touch an elevator knob!*

When they ask about 'Built-Ins' remember that leading kitchen furniture manufacturers build kitchen units to accommodate Moffat 'Built-Ins'—which include all exclusive Moffat features.

MOFFAT

Davies St, London, W1. An Avco of Canada Company

COMPLETE RANGE OF MODELS IS AVAILABLE
24" 30" AND 40" SIZES AS WELL AS BUILT-IN
OVENS AND SURFACE UNITS.



Engineers' Language! For every Plant Engineer who swears at Collins, there are ninety-eight and a quarter who swear by them. Engineers being engineers, this is quite something. As we were saying, we show two 1500kW 240-volt 600 r.p.m. D.C. Generators, one being stripped out for rewinding, t'other being rewound.

COLLINS

Collins Electrical Ltd.
Head Office 115 Clerkenwell Road London E C 1
Central London Works
22 St. Albans Place Upper Street Islington N 1
West London Works
9 & 11 Featherstone Road Southall
Phone Holborn 0212-4 Canonbury 3227-8
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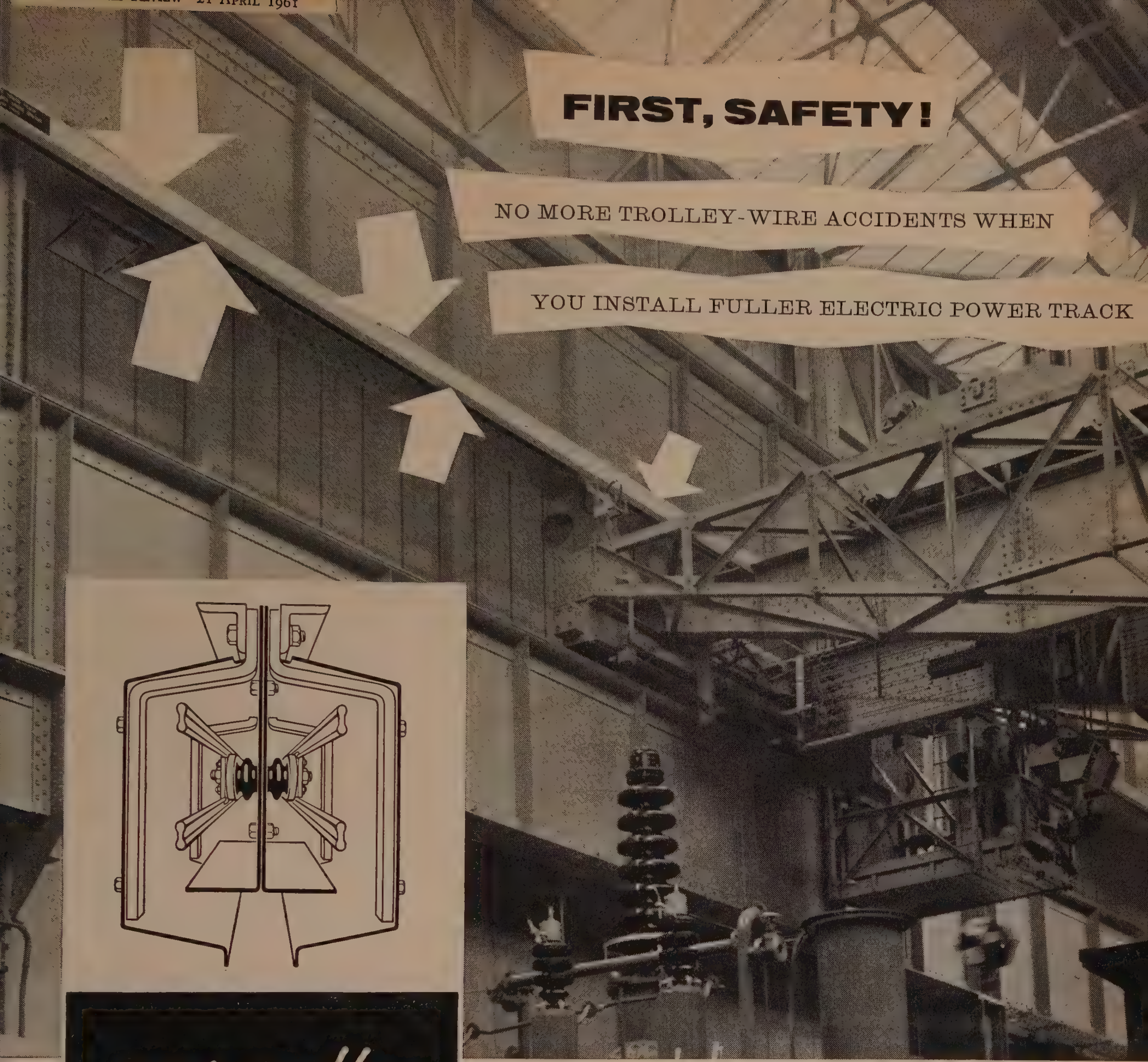
NO MORE TROLLEY-WIRE ACCIDENTS WHEN

YOU INSTALL FULLER ELECTRIC POWER TRACK



consult-

FULLER

ELECTRIC

A member of the Hawker Siddeley Group

Sole U.K. representatives for ASEA Sweden
FULLER ELECTRIC LIMITED
FULBOURNE ROAD · LONDON E.17
Telephone: LARkswood 2350

Also at Birmingham, Glasgow and Manchester

Fuller Electric Power Track eliminates the dangers continually threatened by bare trolley wires. More and more factories are being equipped with this simple protected system that ensures safe working conditions. Power Track is guaranteed to give 100 per cent protection when tested with the standard Test Finger to BSS 3042/1958. Unlimited lengths of track, in straight or curved sections, can be erected for operation on all types of supply up to *200 amps per conductor*. Isn't it time that *your* factory was protected by a Fuller Electric Power Track?

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...get moving today

Your orders don't lie on our desks—they get immediate attention.
We have a wide range of standard cables in stock
—ready for cutting and delivery to you within forty-eight hours!

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Don't get your wires crossed!

—get in touch with us, we're really quite efficient.

We have been producing Copper Wire, Strand and Strip for a long time now and are well equipped to meet your needs.

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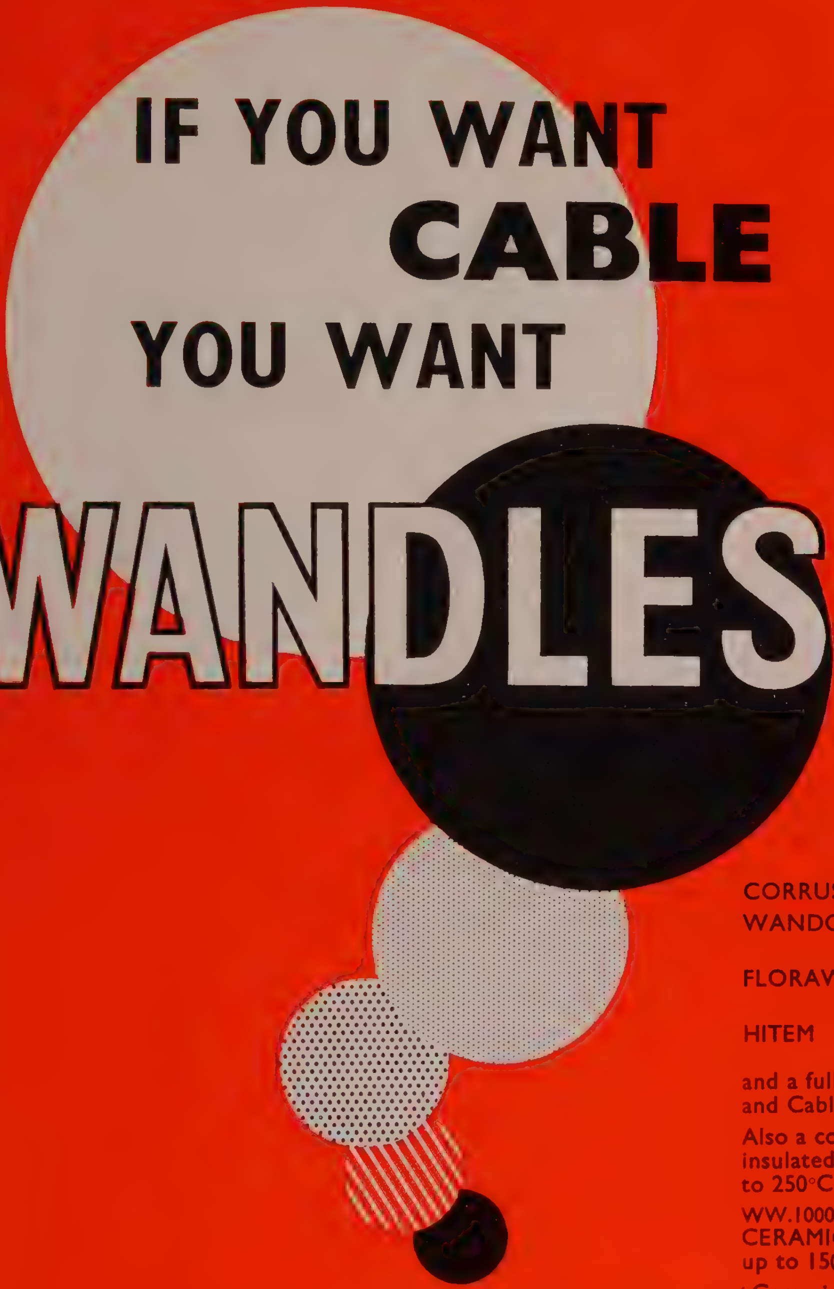

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CABLE
YOU WANT
WANDLESIDE

CORRUSTEEL Armoured Cable
WANDOVERPLAS Aluminium Overhead Cables
FLORAWARM Floor Heating Wires and Cables
HITEM High Temperature operating Thermo-plastic Cables
and a full range of all Domestic Wires and Cables

Also a complete range of PTFE insulated wires for operation up to 250°C.

WW.1000 Cables operate at 1000°F.
CERAMICITE for Temperatures up to 1500°F.

'Ceramicite' is the Regd. Trade Mark of the Consolidated Electrodynamics Corporation of America. We act as distributors in this Country for our American Associates, Warren Wire Company, licensees of Consolidated Electrodynamics Corporation.

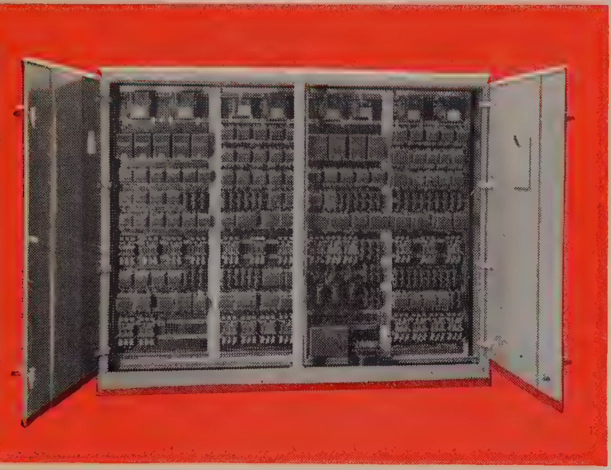
WANDLESIDE CABLES

An independent company in Association with Irish Cables Ltd. and Wandleside Warren Wire Co. Ltd., all in the Falks group

WANDLESIDE CABLE WORKS LTD., 106 GARRATT LANE, WANDSWORTH, LONDON, S.W.18
Telephone: VANdyke 7544 (7 lines) *Telegrams: Wandleside London*

Whichever way

CUSTOM-BUILT CONTROL PANELS



If ever there was a case of "no set answer" it is in the field of automatic controls.

You may require custom-built control panels, or you may prefer to build up your own control systems from individual **M.T.E.** components, **channel framework and standard cabinets.**

Whichever way you look at it, you'll find that **M.T.E.** 'double-service' is the answer.

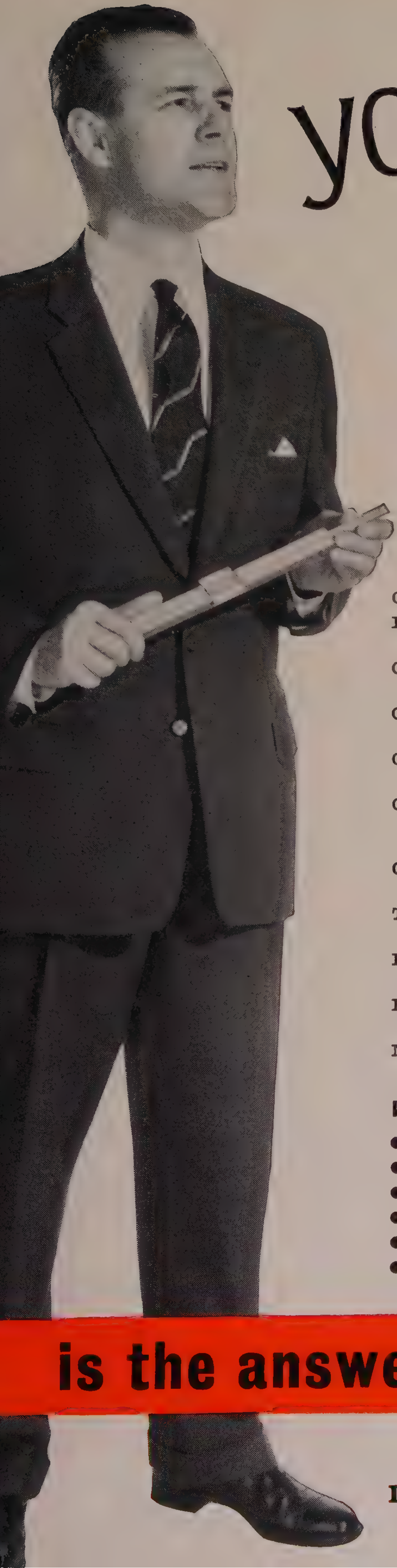
Top left:
Control panel for eight-head rotary indexing machine.

Lower left:
Control panel for industrial refrigeration plant.

MTE 'DOUBLE-SERVICE'

M.T.E. CONTROL GEAR LIMITED

you look at it



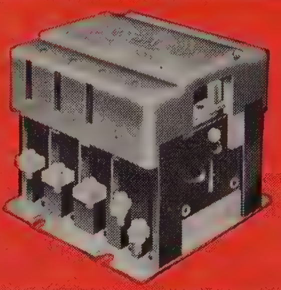
COMPONENTS IN DOUBLE-QUICK TIM

CHECK THESE DELIVERY TIMES

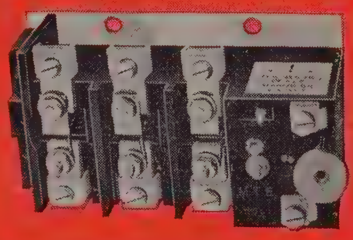
Eight Pole Relays Type UR1	7/9 days
Contactors, 15 Amp, Type UC2L	7/9 days
Contactors, 30 Amp, Type UC2	7/9 days
Contactors, 75 Amp, Type UC3	7/9 days
Overload Relays, Thermal, with Single Phasing Protection	7/9 days
Overload Relays, Magnetic	9/11 days
Timing Relays, Type UT	13/21 days
Isolating Switches, 40 Amp, Type UISO2	7/9 days
Isolating Switches, 150 Amp, Type UISO3	9/11 days
Multi-Lock Terminal Blocks, 15, 40 & 100 Amp	1/3 days

With these design features—

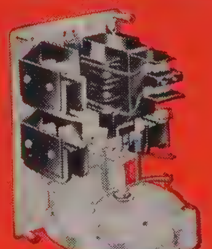
- UNIT CONSTRUCTION
- COMPACT SIZE
- HEAVY DUTY
- WIDE RANGE
- C.S.A. APPROVED
- A.S.T.A. CERTIFIED
- FRONT WIRING
- DOUBLE BREAK
- BS.775 - 1956



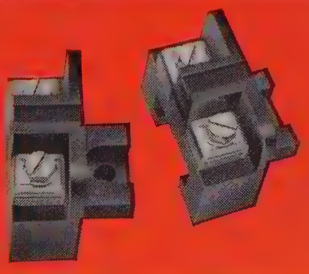
Contactor,
30 Amp,
Type UC2



Overload
Relay,
Thermal,
Type
UOL11



Timing
Relay,
Type UT



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Terminal
Blocks

is the answer

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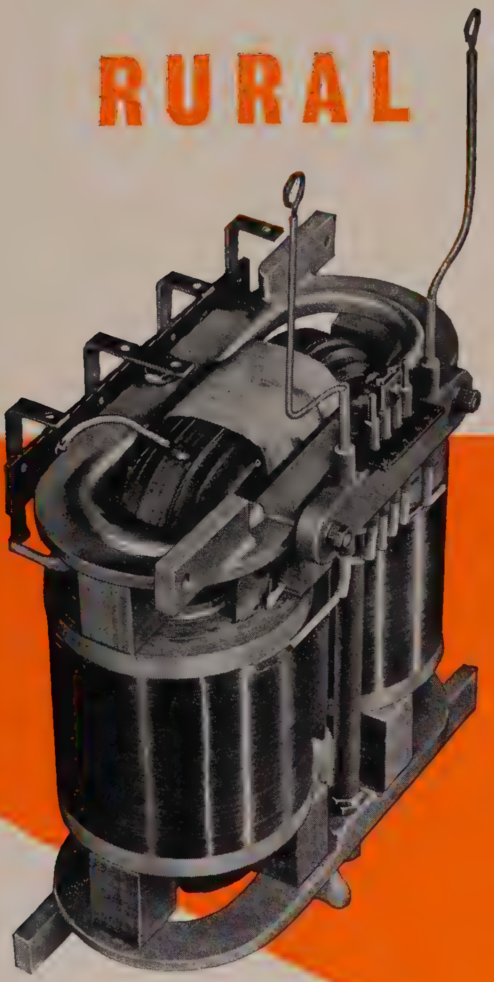
M6

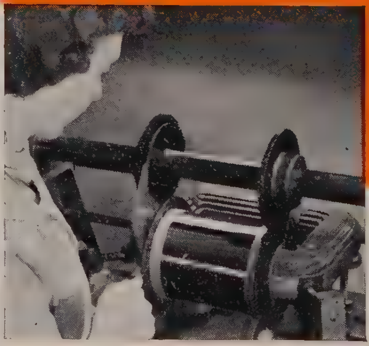
RURAL TRANSFORMERS



of advanced Electrical, Thermal and Mechanical Design

Continuous loop core—improved magnetic performance.
Reduced iron and copper losses.
Low hot-spot temperature gradient.
High resistance to line surges.
Great short-circuit strength.

Closed loop core of grain oriented steel.



Winding a high-voltage coil on a closed loop core.

15-kVA transformer showing double-gap arcing horns, and bolted-on domed and flanged cover.

RATINGS AND VOLTAGES

The transformers are manufactured in a range of five sizes, viz., 5, 10, 15, 25 and 50 kVA and are designed for operating on a single-phase, 50 cycle, 11 kV or 6·6 kV supply.

OVERLOAD CAPACITY

The transformers are capable of withstanding the following overloads for two hours, without injurious heating, following continuous full load with an average ambient temperature not exceeding 20°C.

5 kVA	100%
10 kVA	45%
15 kVA	25%
25 kVA	15%
50 kVA	As B.S. 171 and C.P. 1010.

IMPULSE LEVEL

The H.V. windings are designed for the following impulse levels :—

6·6 kV	75 kV full wave.
11 kV	100 kV full wave.

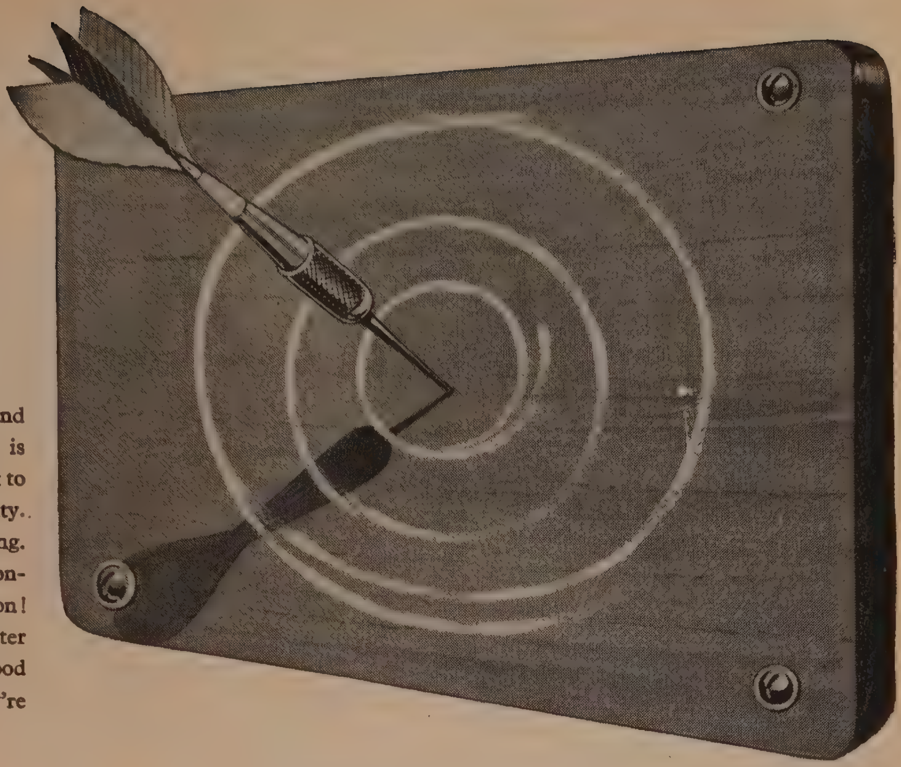
PERFORMANCE

	5 kVA	10 kVA	15 kVA	25 kVA	50 kVA
Magnetising Volt-Amperes (approx.)	30	45	60	90	150
Iron loss at normal voltage (watts)	22	38	49	70	125
Copper loss at normal rating 75°C. (watts)	170	300	420	630	1070

Write for Leaflet No. 523.

BRUCE PEEBLES & CO LIMITED

EDINBURGH



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WOOTTON-the meter board people

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ALMA WORKS · PONDERS END · MIDDX
Telephone: HOWard 1858

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the mighty **JEAN BART**

DEEP SEA TUG

uses

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A C9 type of coupling is used between each of the two TNAB 338 Werkspoor 8-Cylinder Diesel engines, and the single reduction and reverse gearbox.

WITH INDUSTRIAL TYPE ELECTRICAL MOTORS:

IT REDUCES *the peak amperage during starting*

ELIMINATES *starting shock and snatch*

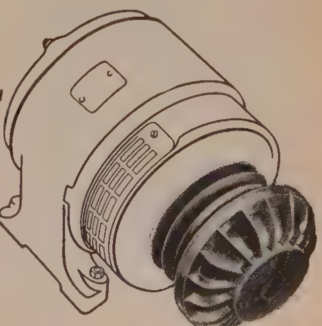
PREVENTS *overloading electric motors and burning them out: breakage of fragile materials due to sudden starting shock: damage due to overload.*

INCREASES *the life of belt and gearing.*

PERMITS *inching and rapid reversal.*

SAVES *the cost of high starting torque motors.*

RELIEVES *the motor of load.*



for technical information and assistance write to:

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A Member of the Specialloid Group of Companies
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Telephone: Leeds 20936 & 31471/7

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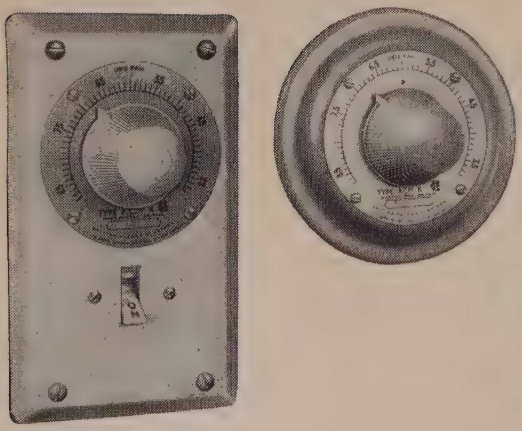

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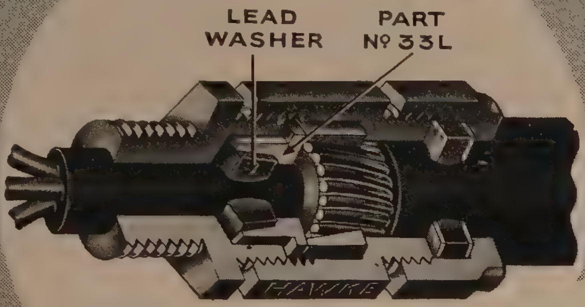
A New Gland

for

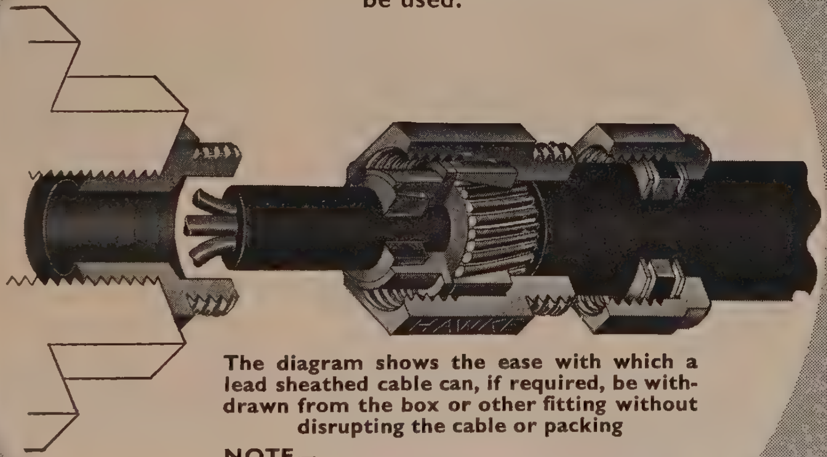
FLAMEPROOF & STANDARD INSTALLATIONS



The parts shown replace normal parts Nos. 22 and 33 for lead sheathed cables

An alternative method of gripping inner sheath on lead, P.V.C. and all other types of sheathed cables

This alternative method can be applied on the following glands: G62, G63, G64, G65, G67 and G68.
If it is required, customers should refer when ordering, to the normal gland size required and state the type of cable to be used.



The diagram shows the ease with which a lead sheathed cable can, if required, be withdrawn from the box or other fitting without disrupting the cable or packing

NOTE—
CABLE OR WASHERS NOT DAMAGED IN ANY WAY

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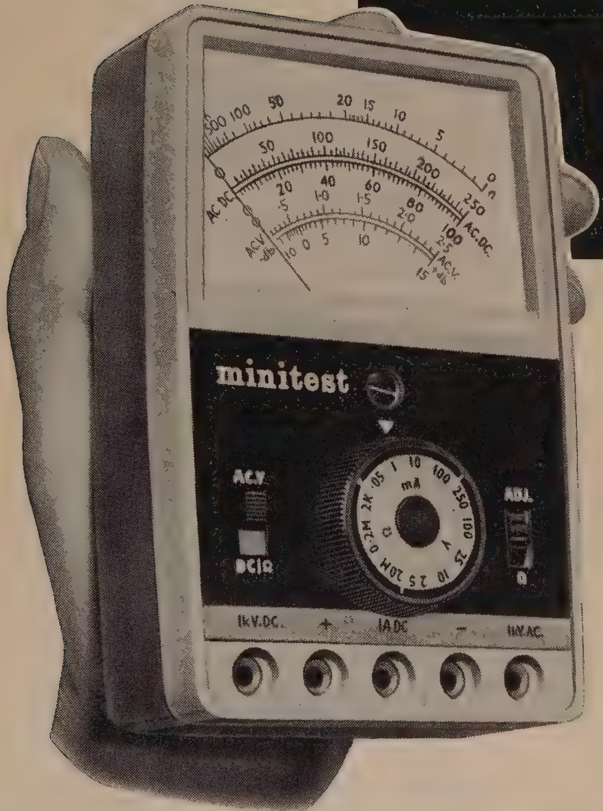

A new compact instrument suitable for the measurement of D.C. voltages and currents, A.C. voltages and ohms. Its high sensitivity renders it suitable for testing and fault location in all types of electrical and electronic circuits. It is well built to ensure long and satisfactory service. The instrument is economically priced and supplied with test leads with plug connections at one end. (Leather carrying case available as an extra).

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A.C. volts.	2.5,	10,	25,	100,	250,	1000.
D.C. volts.	2.5,	10,	25,	100,	250,	1000.
D.C. amps.	50 μA,	1mA,	10mA,	100mA,	1A.	
Ohms.	2000	200,000	20 MΩ			

ACCURACY

D.C. Volts & Amps.	± 2% of full scale deflection
A.C. Volts.	± 3% of full scale deflection
	+ 5% at centre scale.

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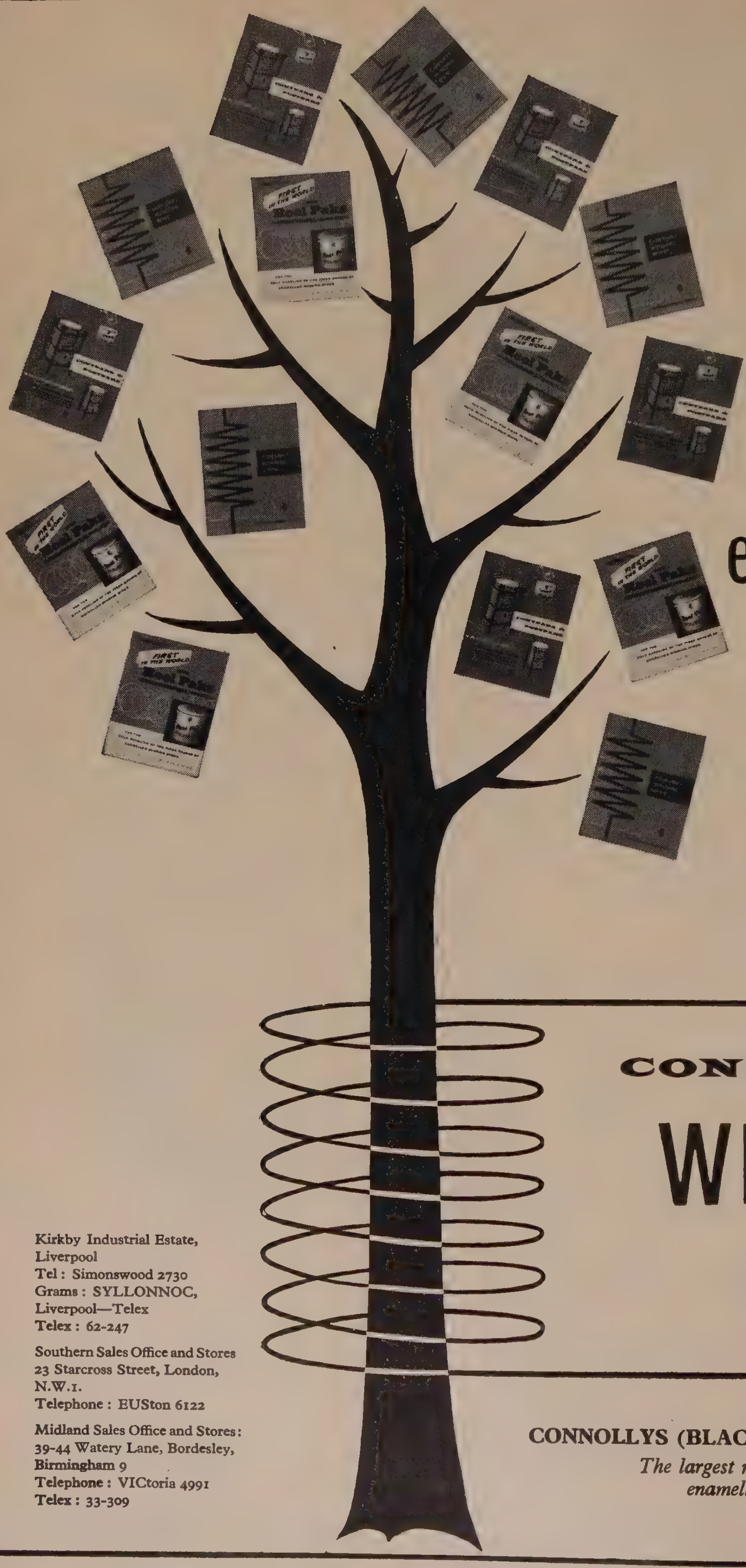

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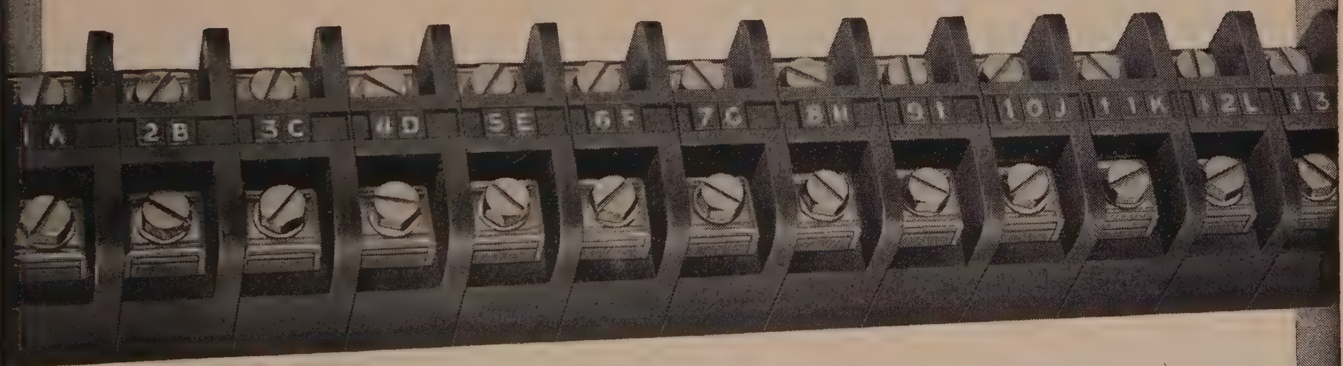
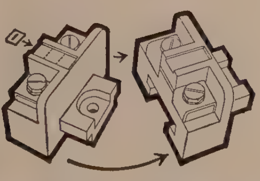


M·T·E MULTI-LOCK TERMINAL BLOCKS



With Multi-Lock you can build up complete terminal block assemblies consisting of any number of single units you choose. They are available in three ratings (15, 40 and 100 amp.) and can be mounted to any surface without special brackets or channels. The 40 amp. and 100 amp. blocks also interlock with one another to give two different ratings in one assembly. All Multi-Locks meet B.S.I. and C.S.A. specifications.

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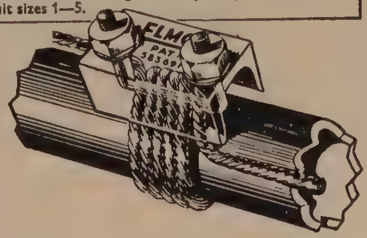
for earthing cables up to	7/0.036"	7/0.064"	19/0.064"	19/0.083"
to fit B.S. conduit sizes i.e. in trade terms	1, 2 & 3 ½" to ¾"	4 & 5 1" and 1¼"	6 & 7 1½" and 2"	8, 9 & 10 2½" to 3½"

NOTE ALSO: Type A123 is suitable for Earthing Cables up to 7/0.029" and for B.S. conduit sizes 1—5.



"Elmo" Earthing Clamps are of robust construction. Impossible for wire to pull out, always under tension, therefore a most satisfactory earth and a permanent safeguard.

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CONDUIT COUPLINGS

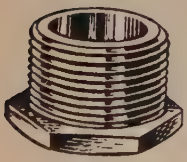
Made in zinc base alloy in the following sizes:

Electric Thread (Male) ⅝" ¾" 1" 1¼" 1½" 2"
Inside Diameter ⅝" ¾" 1" 1¼" 1½" 2"

Electric Thread (Male) ⅝" ¾" 1" 1¼"
Inside Diameter Flexible Conduit ½" ⅝" ¾" 1"

WITH EARTHING TERMINAL

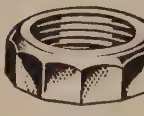
Special Features: Integral Earthing Terminal, tinned ready for soldering. Fixing screw for continuity. Internal Threads suit all makes of flexible tubing.



MALE
Hex. Section

CONDUIT BUSHES

Made in the following sizes:
MALE: Electric Thread
⅝" ¾" 1" 1¼" 1½" 2"
FEMALE: Electric Thread
⅝" ¾" 1" 1¼" 1½" 2"



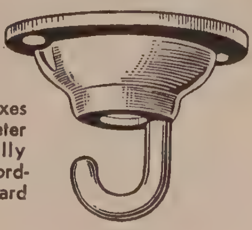
FEMALE
Flat Face Section for Spanner (except ¾" size which is round)

CONDUIT HOOK

For fluorescent lamps and overhead lighting fittings. Screwed ¾" thread, male electric. Made to fit all standard boxes with two holes 7/32" diameter —2" centres diametrically opposed. Designed in accordance with British Standard Specification.

CEILING PLATE

One hook



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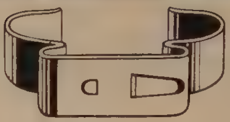
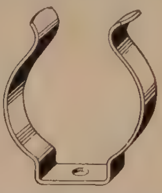
Nickel Plated or Polythene Coated, these clips are available in sizes to grip from ¼" to 2".



No. 101



No. 100/

Note that clip No. 98/1½" (as above) has an alternative method of fixing, eliminating necessity of screws.

PHOSPHOR BRONZE CLIPS

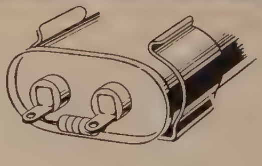
No. 102/

In Self-Finish, Nickel or Polythene Coated. In sizes to grip from 9 mm. to 22 mm.

No. 103/

CAPACITOR CLIPS

No. 97/



Specially designed for fluorescent lighting and in sizes to grip 1½" x 1⅜", 2⅛" x 1⅜", 2⅝" x 1⅝", and 3" x 2". The illustration above shows capacitor clip in position.

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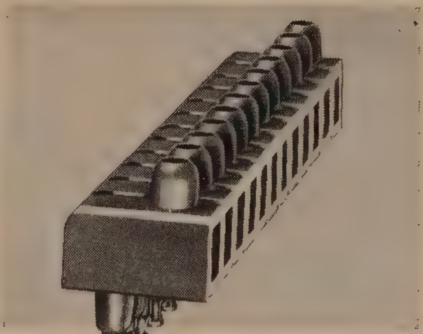

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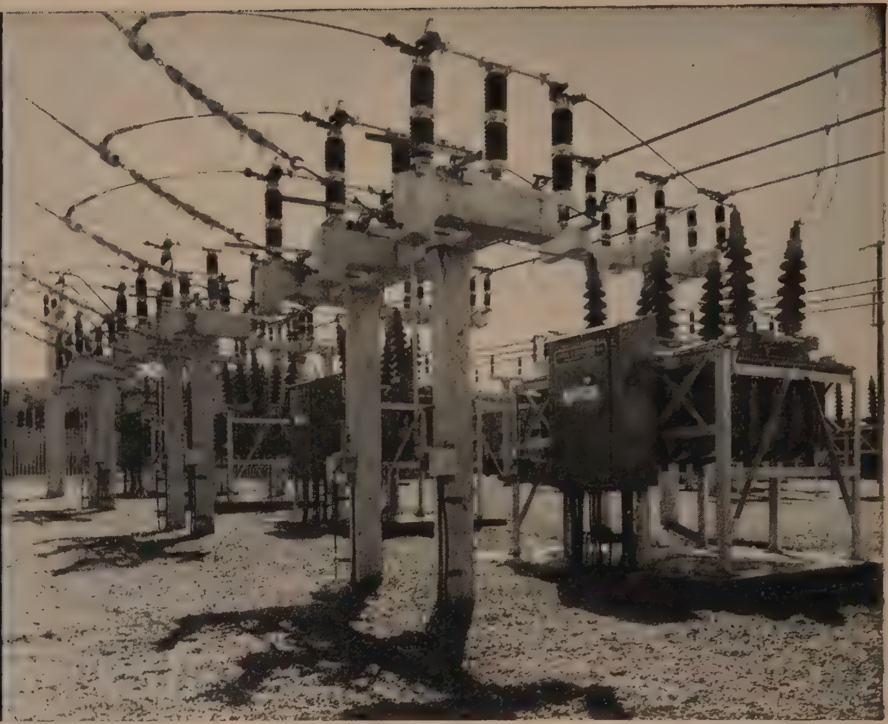

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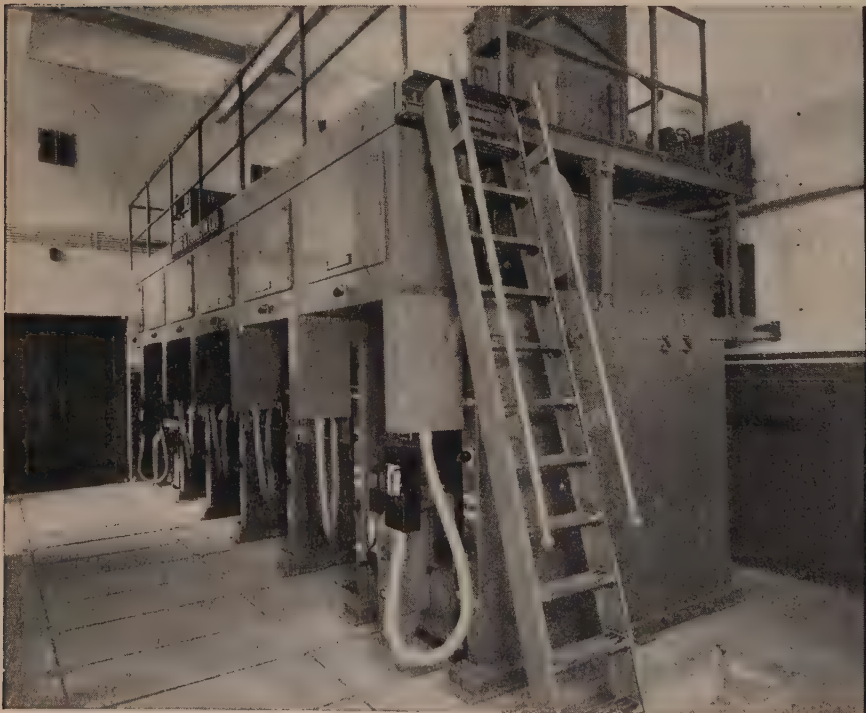

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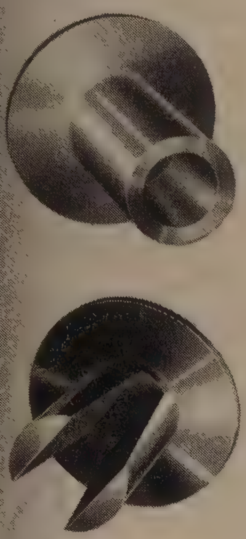

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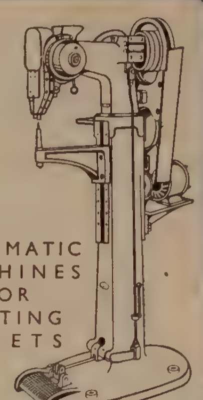

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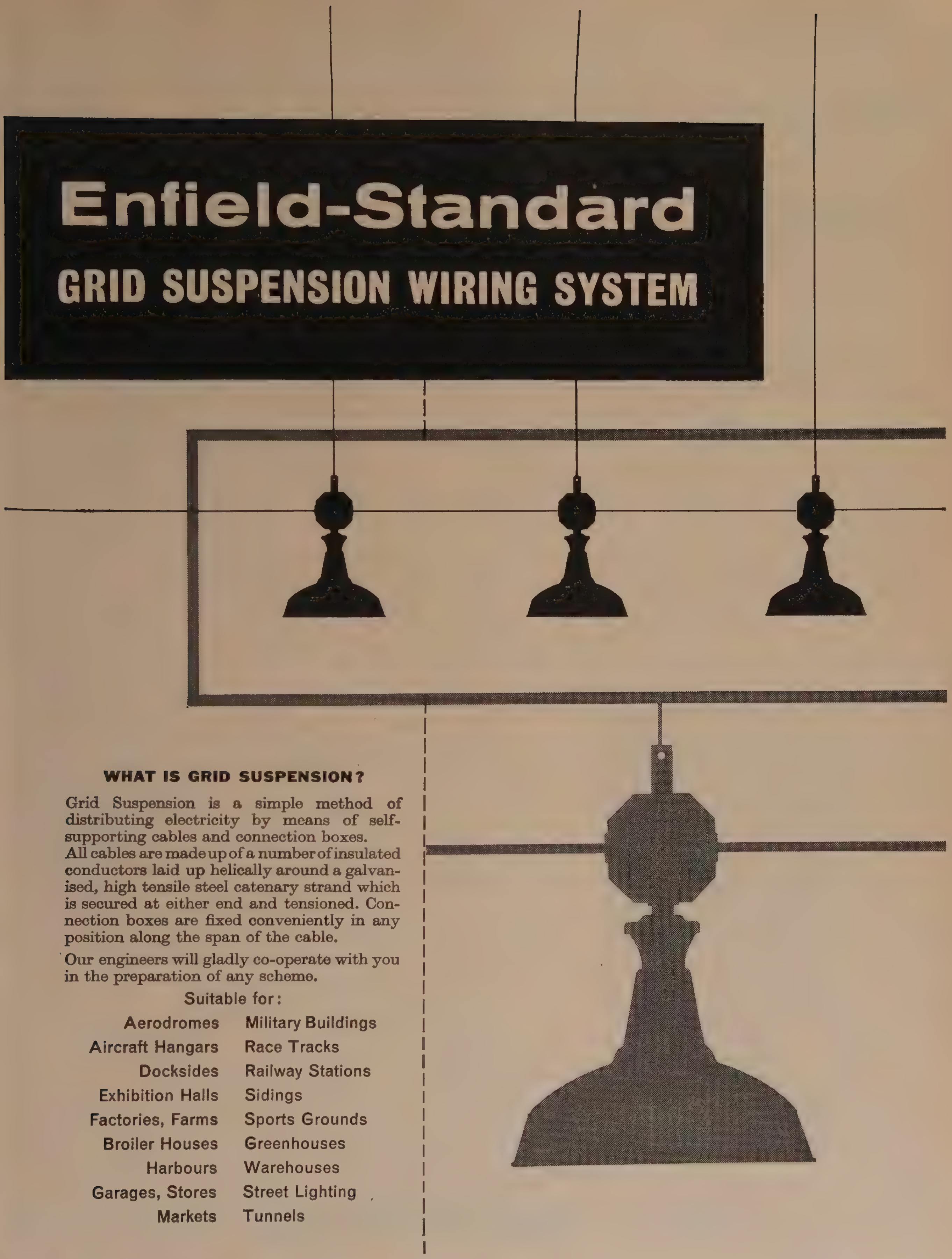

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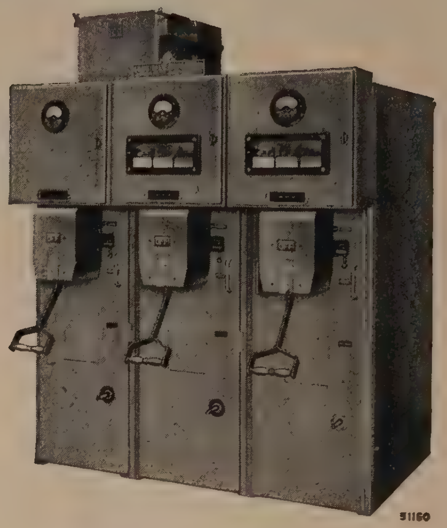
CIRCUIT BREAKERS



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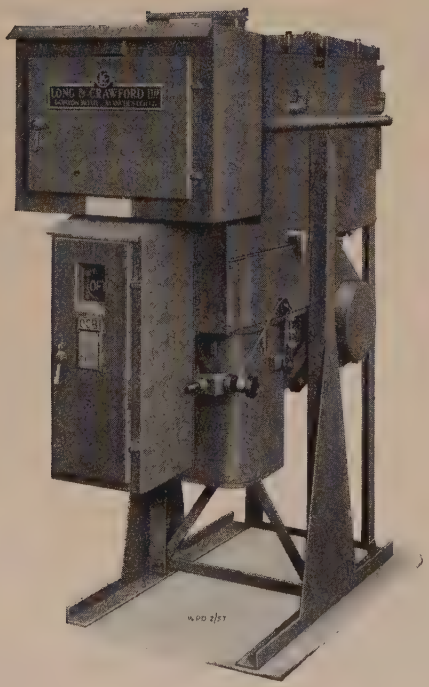
ALD range of indoor vertical isolation air-insulated Circuit Breaker Units. Current rating up to 1,200 amps. Rated breaking capacities up to 350 MVA at 11 kV, 250 MVA at 6.6 kV and 150 MVA at 3.3 kV. Fitted with Hand, Spring or solenoid power-closing mechanism.



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WPD range of outdoor oil and compound filled Circuit Breaker Units. Current ratings 400/800 amps. Tested fault ratings : 350 MVA at 11 kV and 250 MVA at 6.6 kV. Spring, Hand or solenoid mechanisms.

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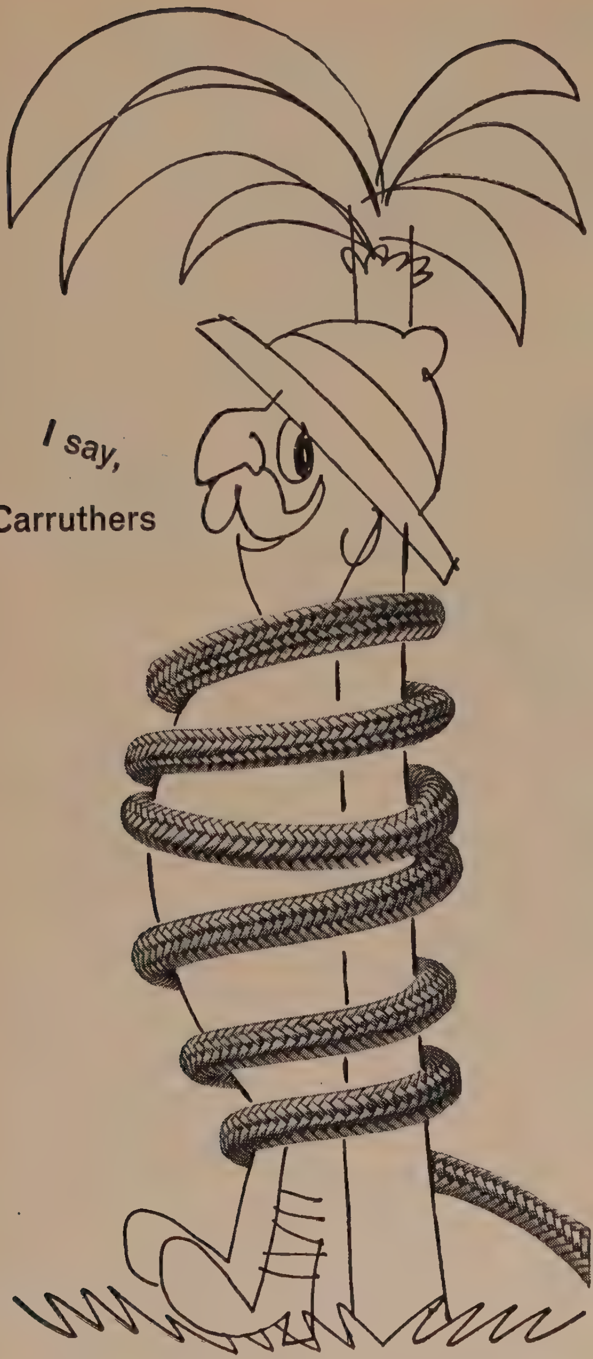

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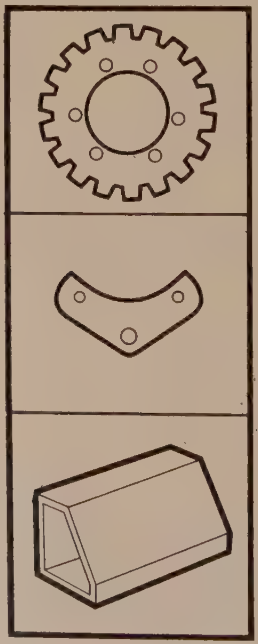

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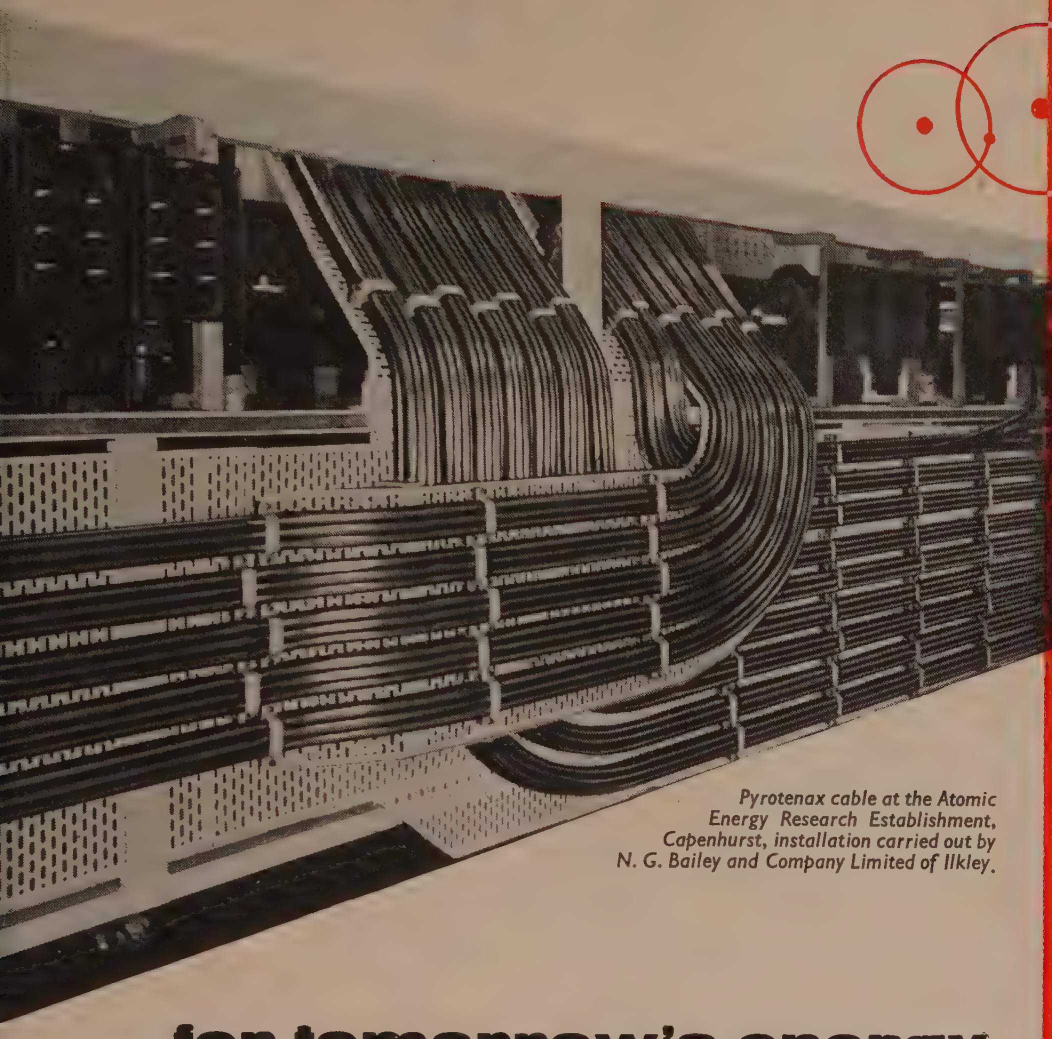

Pyrotenax cable at the Atomic Energy Research Establishment, Capenhurst, installation carried out by N. G. Bailey and Company Limited of Ilkley.

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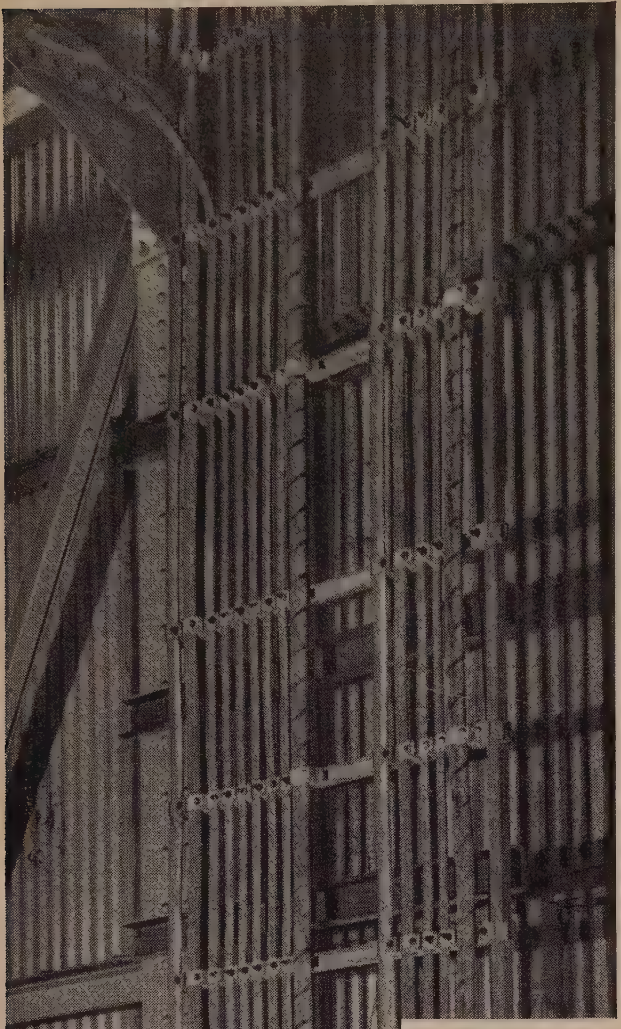

This immaculate cable run is part of the Central Electricity Generating Board's new installation at Skelton Grange 'B' Power Station, Leeds. It employs the new C.S system of cable supports which is gaining rapid favour everywhere. This system was chosen not only for its excellent appearance but also for the following outstanding advantages:

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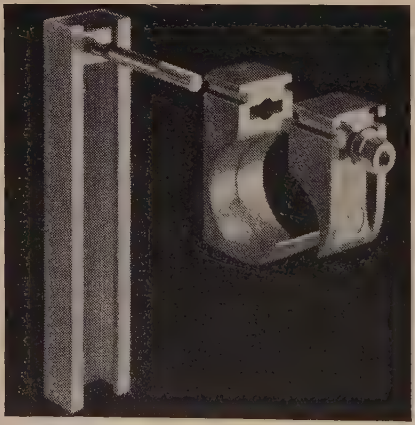

An exploded view of the C.S. system showing the principal components. The backnut at the channel end is self-locking.

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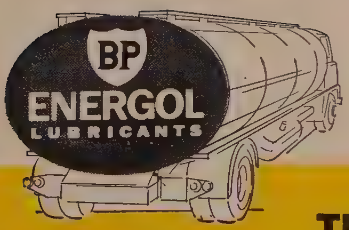

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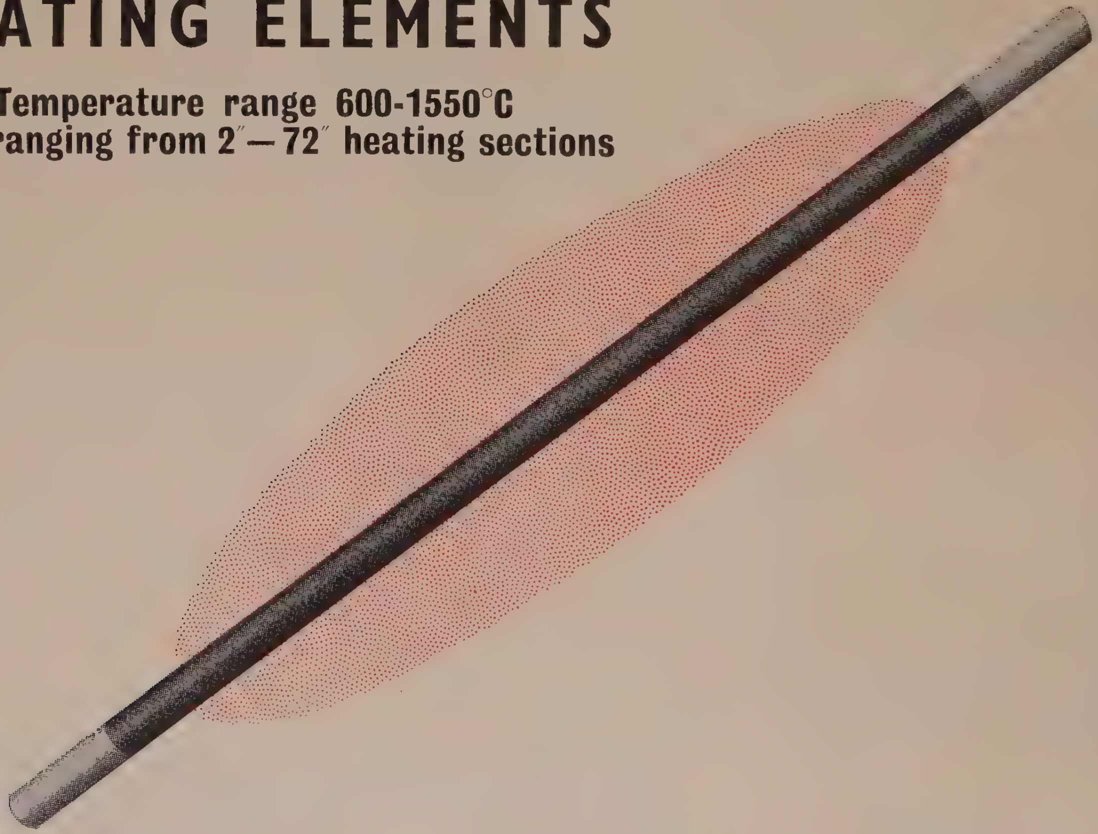

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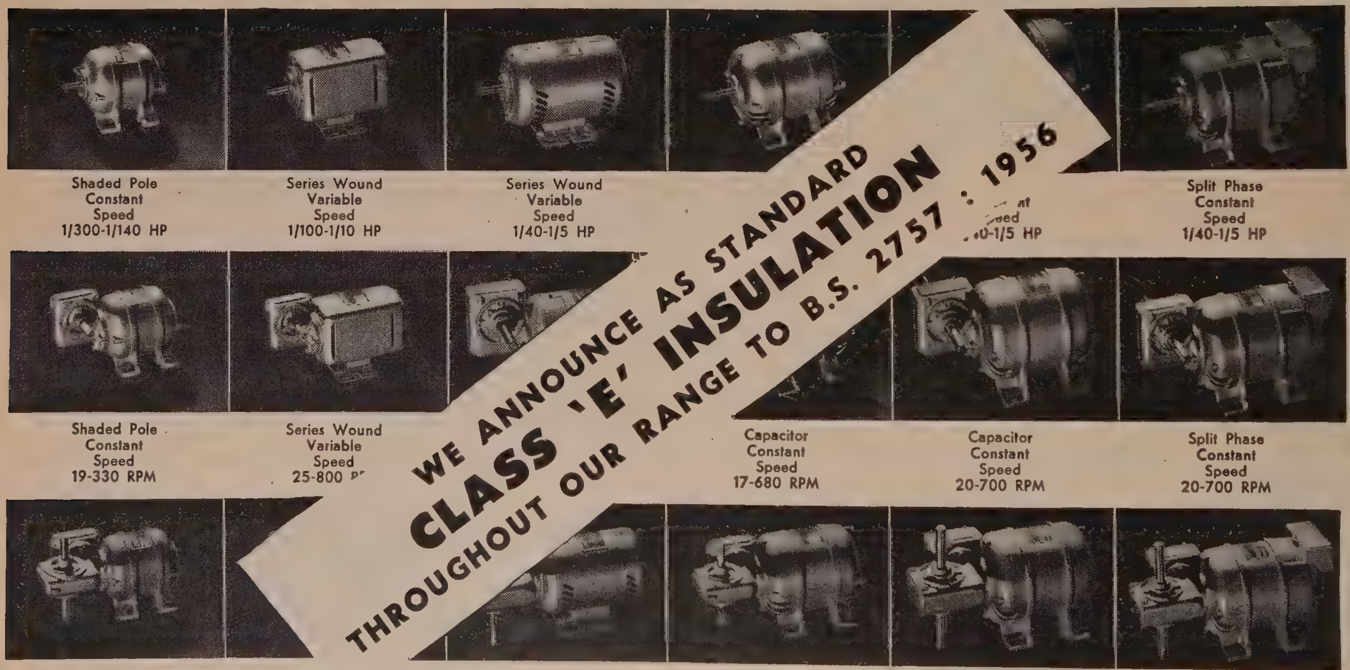

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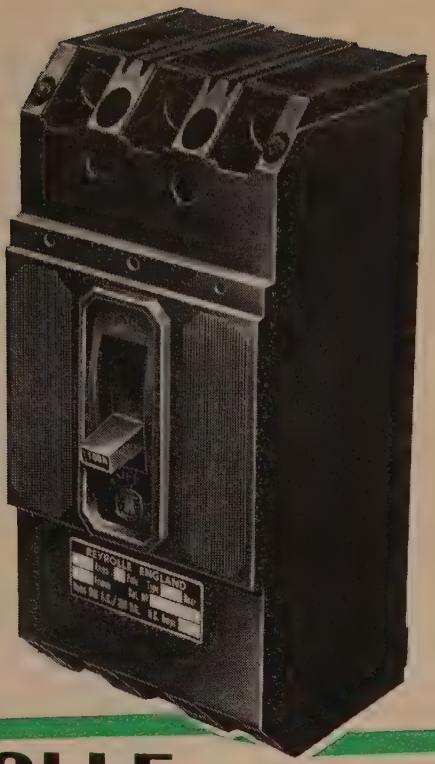

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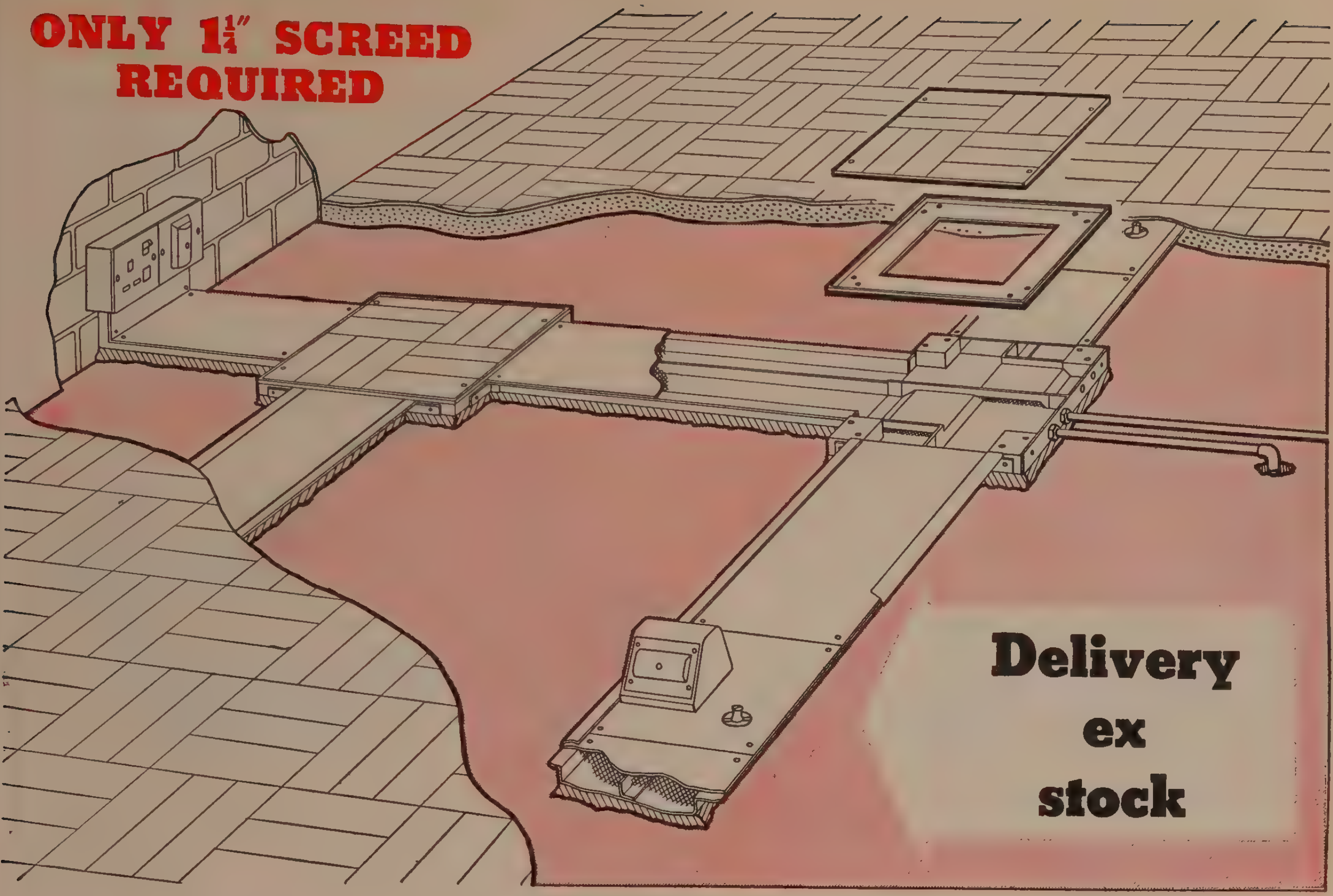

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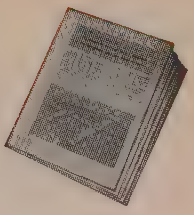

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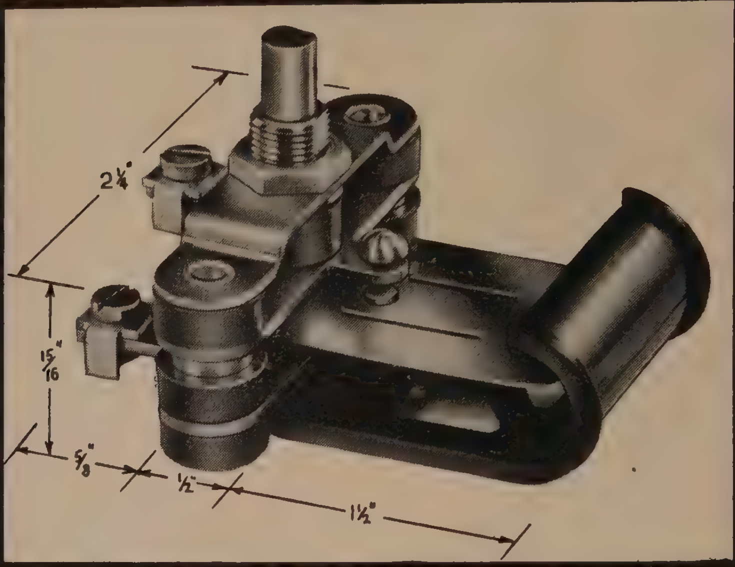
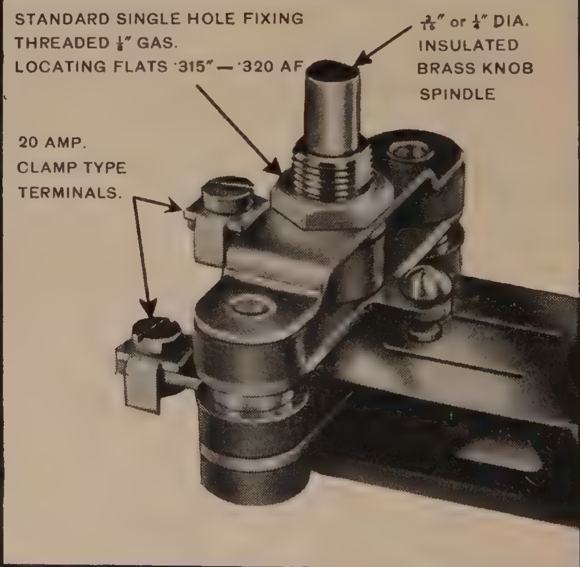


FEATURES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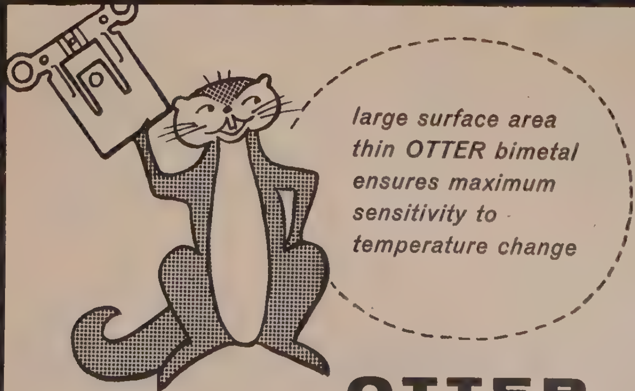
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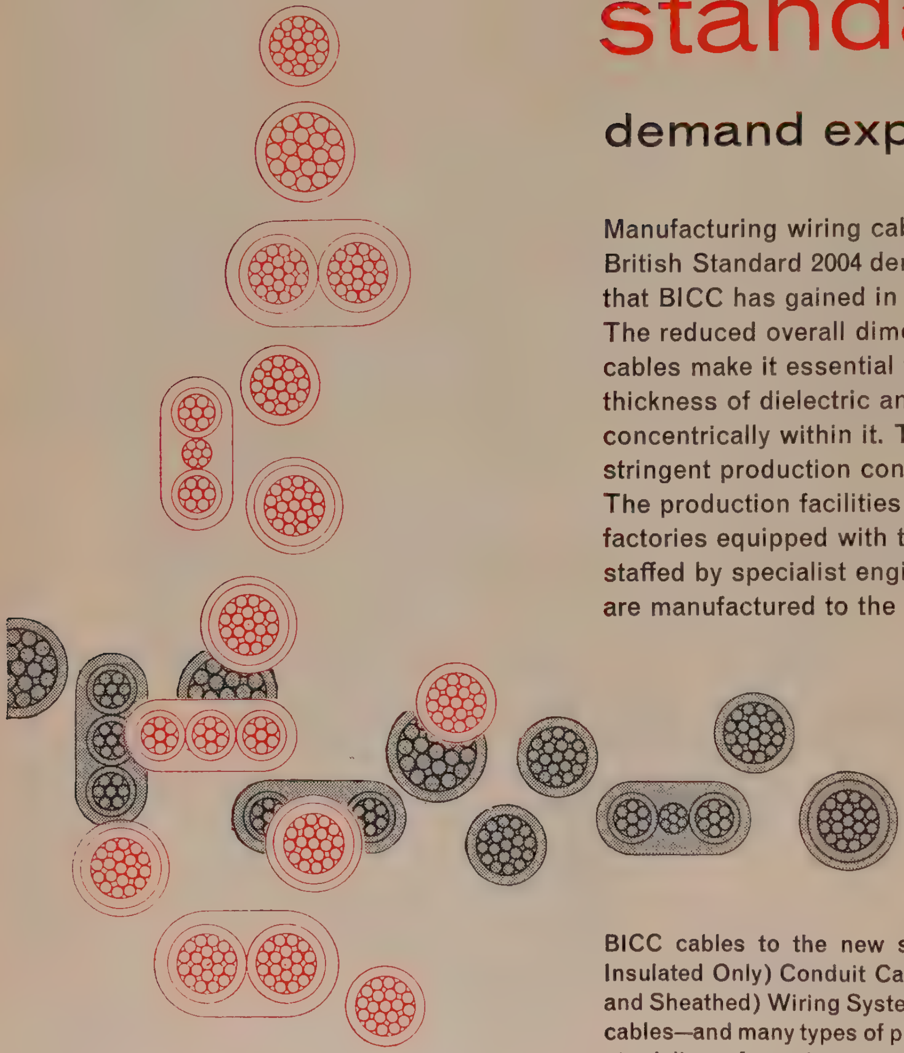

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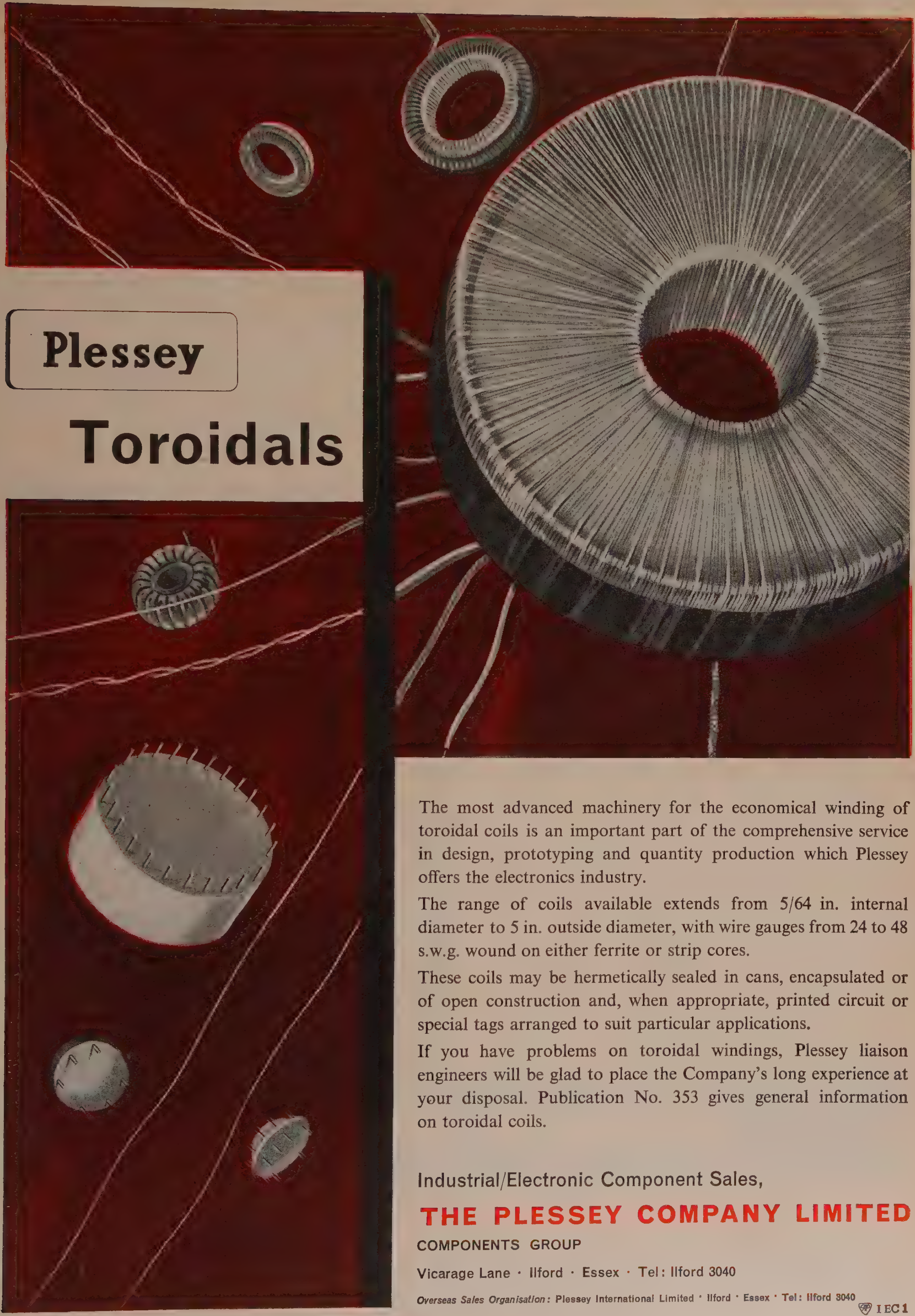

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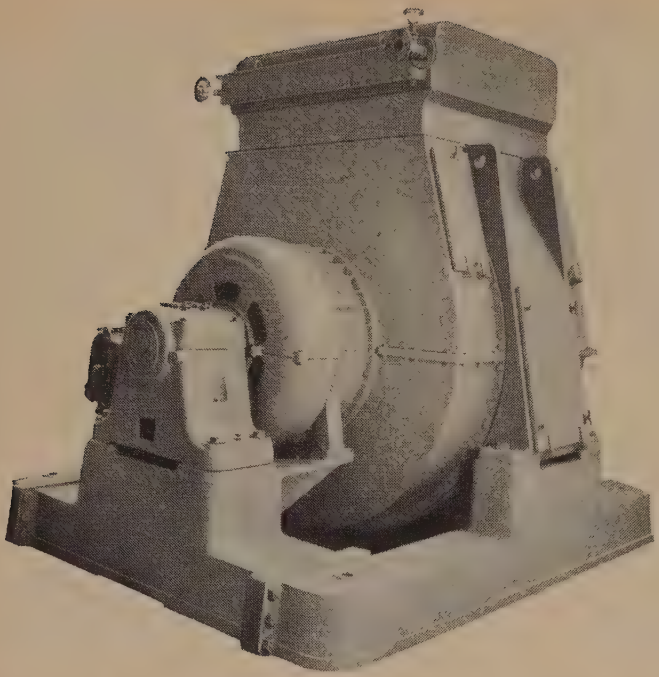
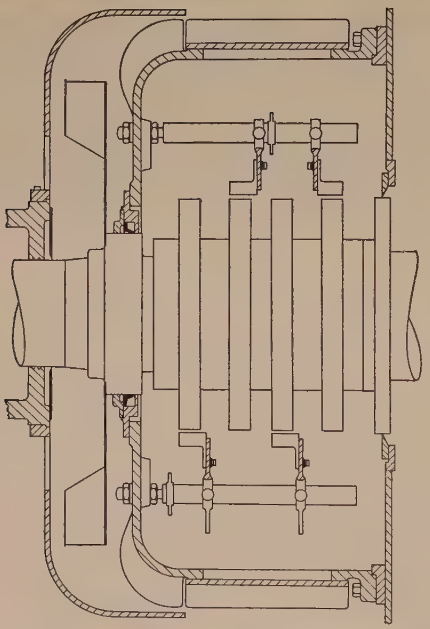


What do you—or any engineer—mean by the 'design' of a motor? Its electrical design? (Motors of the same type and power can be very much alike in this). Its looks? Or the form it takes: *how* it is put together? We think there is something of all these implied; along with the idea of the way various specific problems of detail have been met and dealt with. Such details distinguish one manufacturer's machine from another because they depend, not on theory, but on experience; on how long the manufacturer has been in the game; on . . .

This thing called know-how



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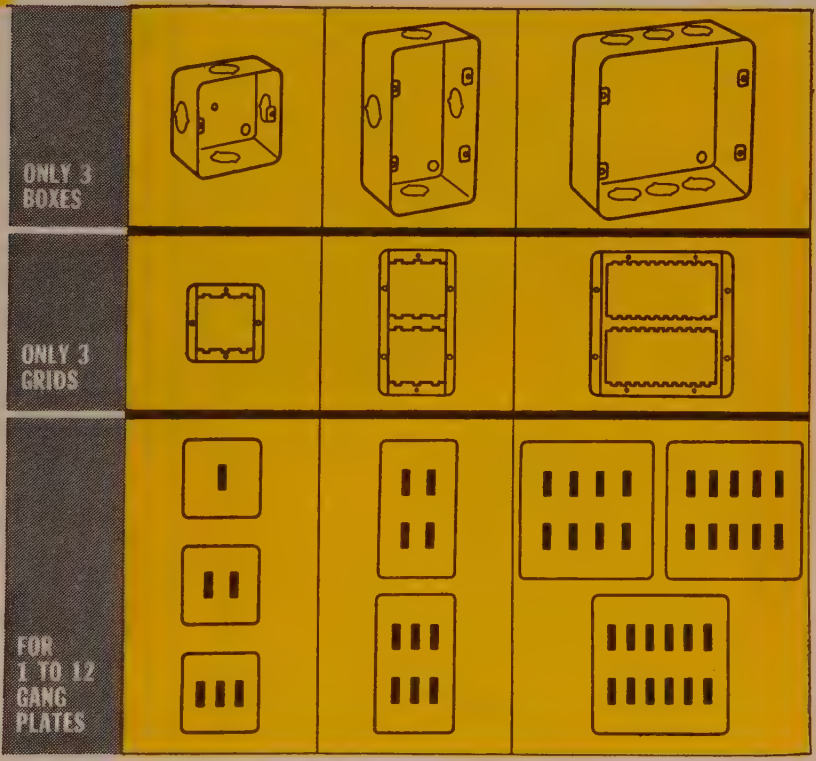

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Eighty-Ninth Year of Publication

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IN THIS ISSUE

689 **The Five-Year Plan**

The Government White Paper on the financial and economic obligations of the nationalised industries proposes that the Boards shall be given a period of five years over which their revenue surpluses are to be not less than sufficient to cover their deficits

691 **Centenary of M.I.T.**

Sir Willis Jackson, F.R.S., who attended the recent centennial celebrations of the Massachusetts Institute of Technology, traces the history of the Institute and describes the scope of its work

695 **Engineering and Marine Exhibition**

The 23rd biennial Engineering, Marine, Welding and Nuclear Equipment Exhibition opened at Olympia yesterday (Thursday) and continues until 4th May. More than 500 exhibitors are taking part. In this article reference is made to some of the more outstanding electrical exhibits

719 **Nationalised Industries**

The proposals outlined in last week's White Paper are summarised and discussed by Mr. D. J. Bolton

721 **The Engineer in Commonwealth Development**

This year's Graham Clark Lecture was given last week by the Duke of Edinburgh who spoke of the engineer as the key figure in the material progress of the world

723 **Magnetic Fields in Turbo-Generator End Windings**

Summary of two papers presented at a meeting of the Supply Section of the Institution of Electrical Engineers last week

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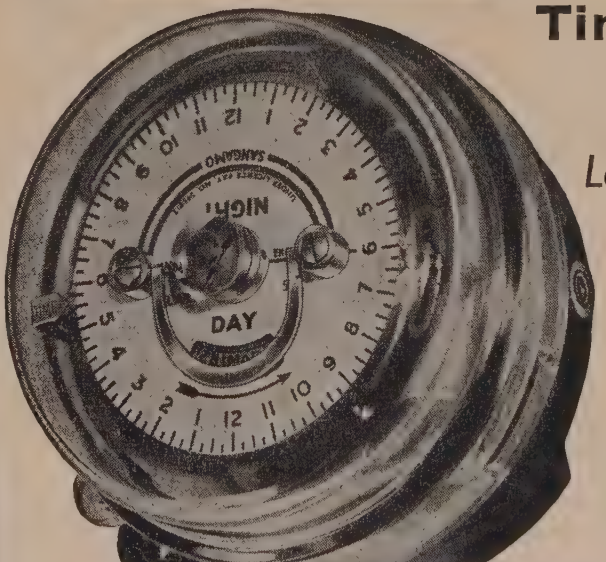

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ELECTRICAL REVIEW

21 April 1961 Vol. 168 No. 16 Established 1872

The Five-Year Plan

ANOTHER stage in the control of electricity supply finances is marked by the publication of the Government White Paper, " The Financial and Economic Obligations of the Nationalised Industries."* It represents a two-way development, with in some ways more and in some ways less control than before. Briefly, the requirements in the Electricity Acts have been not so much strengthened as made more specific. In place of a somewhat vague requirement regarding revenue cover " taking one year with another " the Boards are now to be given a precise period of five years (presumably a floating five years) over which their revenue surpluses are to be not less than sufficient to cover their deficits. Depreciation provision is to be on a specified basis, and a five-year financial target is to be set for each industry (excluding the railways) designed to make each one of them financially more independent and less reliant on outside investment.

As is pointed out on p. 715 of this issue, the two requirements which are specified for depreciation provision add up to a single requirement, namely, depreciation on a replacement-cost basis. In this matter the electricity industry is fortunate on two counts. First, it has largely anticipated the more rigorous replacement-cost requirement by setting-up a supplementary reserve fund (though not of a specific magnitude) for this purpose. In the second place, so far as generation expenditure is concerned, the sting has largely been taken out of the replacement-cost hazard by the relatively small rise (sometimes even a fall) in generating plant prices. The combined effect of larger units and more advanced steam conditions means that the cost per kilowatt of new plant may be little or no greater than that of the plant which it replaces.

Inevitably any stepping-up in financial requirements is closely linked with the capacity of the Boards to raise prices. Although the Government possesses no formal power to fix prices in the nationalised industries, there is an informal arrangement whereby the chairmen of the Boards ascertain in advance the views of the appropriate Ministers when they prepare to make substantial changes in the level of their prices. In the Government's view these arrangements should continue. At the same time it is believed that the new definitions which have been laid down of the financial and economic obligations of the industries will reduce the occasion and need for outside intervention.

It cannot be said that the electricity industry has suffered very seriously from such intervention in the past, and doubtless it has profited from the rule that the more prosperous one is the less likely is one to be interfered with. In another direction, that of capital investment, the industry would doubtless welcome an assurance that the programme, once agreed on a long-term basis, would not be interfered with on short-term lines, and that there would be no more blowing hot and cold in order to check a recession or moderate a boom.

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* H.M. Stationery Office, Cmnd. 1337, price 1s.

There is a slightly ominous ring in the White Paper statement that "the Exchequer would expect capital employed in this kind of business to earn a higher rate of return than the cost of the money to the Exchequer." The vital question is where the higher earnings are to go. In pre-nationalisation days the practice of some local authorities was to milk the electricity profits to relieve the rates. It would be most unfortunate if we were now to be faced with a State milkman instead of a municipal one.

EXPORT FINANCE

The improvement announced last week in the methods of financing and insuring exports through the Export Credits Guarantee Department will be most welcome to the electrical industry. Of particular importance is the decision to allow the E.C.G.D. to guarantee for periods longer than five years loans made to overseas purchasers by financial institutions in the City of London. In recent years exporters of capital goods, particularly in the case of large projects such as power stations, have not only had to face increasing price competition—they have also had to shoulder the unfamiliar burden of arranging the medium- and long-term credits required by the purchaser. The cost of these financial activities has frequently had to be included in the tender, thus making the price of the equipment seem unduly high.

Under the new arrangements manufacturers will again be able to concentrate on their proper role of making and selling their goods, and they will normally get full payment on completion of the contract. Long-term credits will now be regarded correctly as investment loans. They will be made direct to credit-worthy purchasers and will be covered by an E.C.G.D. guarantee of repayment. The object of the new scheme is to encourage the use of private funds for export finance and there has already been an encouraging response from the City. In "highly exceptional" cases the Government has even agreed to provide finance itself through Exchequer loans.

EFFICIENCY STILL RISING

An indication of the keen rivalry which exists between those operating the generating stations of the Central Electricity Generating Board is given by the list of the twenty most efficient stations which is published in this issue. Last year, the average efficiency of the "top twenty" stations was 31·49 per cent (against 30·67 per cent in 1959) and not one of them had an efficiency below the 30 per cent mark. In 1959 seven stations had efficiencies of less than 30 per cent. Five of the stations which were in that year's leading twenty have been supplanted, and the stations appearing for the first time are High Marnham, Staythorpe "B," Northfleet, Belvedere and Aberthaw. Almost without exception, all the stations which appeared in the 1959 list increased their operating efficiencies.

THE CONTRACTORS' CONFERENCE

To mark its golden jubilee year the Electrical Contractors' Association is extending the period of its annual conference at Eastbourne in June and widening the scope of the proceedings. As will be seen from the details of the programme on page 716 of this issue there are to be two symposia. In the first the director and two past-presidents will review the history, present position and prospects of the Association; in the second four representatives of manufacturers of electrical installation equipment will discuss their relations with the contractors and make suggestions for closer co-operation between them. There is also to be a discussion on office lighting.

In spite of the expansion of the electrical contracting departments of the Electricity Boards the members of the E.C.A. are still responsible for a very large proportion of the installation work carried out in this country. They are valuable in a "mixed economy" of this kind. Because of the competition of the Boards they are kept on their toes and thus provide a means of gauging the fairness or otherwise of the Boards' charges for installation work, which is good for both parties.

THE ENGINEER'S ROLE

Many influential people in politics and commerce view the professional engineer as a mere tool in industrial activities. It is therefore gratifying when a "layman" shows as much appreciation of engineering as that displayed by the Duke of Edinburgh in his Graham Clark lecture, delivered at the Institution of Civil Engineers last week. The Duke propounded the theme that if the material standards of people throughout the world were reasonably comparable, there was a greater chance of avoiding conflict and in this the engineer bore the chief responsibility.

Material development in the broadest sense was a good thing but, said the Duke, it did not necessarily imply a higher standard of civilisation. Thus, to make a worth while contribution, the engineer had to take into account the profound and lasting influence of many large-scale projects, modernisation plans and general industrial activities on this and future generations. The engineer also had to ensure that technical knowledge was adequately passed on to the next generation of engineers. To do all this, some sort of professional organisation was necessary and the Duke said that he was delighted to know that the engineering institutions in Britain had been getting closer together in recent years with highly satisfactory results.

CENTENARY OF M.I.T.

By **WILLIS JACKSON**, F.R.S.

In this report Sir Willis Jackson traces the development of the Massachusetts Institute of Technology over the 100 years since it was founded and describes the scope of the work which is conducted there. The recent centenary celebrations are then described and comments are made upon the future of scientific and technical education

FROM 3rd to 9th April the Massachusetts Institute of Technology, known internationally as M.I.T., celebrated the 100th anniversary of its foundation in the company of several thousands of its alumni and many guests from within the United States and from overseas. Those who know M.I.T. only by name, as well as those who have had an opportunity to visit it, may like to learn something of its background and present activities, and of the events of this historic week.

In 1846 two brothers, Henry and William Rogers, both geologists, conceived a plan for a Polytechnic School, " a school of practical science," in Boston, Massachusetts. On 10th April, 1861, after 15 years of hard work and disappointment, they were granted a charter by the Commonwealth of Massachusetts, and Boston Tech. was born. Unfortunately, the Civil War began four days later and its first activities, conducted in rented premises, were delayed until 1865. In 1866, however, the Tech. acquired a building of its own and this it continued to occupy until, as M.I.T., it moved, in 1916, a few miles away to a small part of its present 120-acre campus in Cambridge, the home of Harvard University.

An attempt by Harvard in the 1870's to form an alliance was resisted, and throughout its history M.I.T. has remained an independent endowed institution receiving no support from the State of Massachusetts and only a small Federal grant. This independence and the continuous growth of the Institute have been achieved by a measure of financial assistance from its alumni of which there is no counterpart in the United Kingdom, by the help of many large benefactions, by the immense scale of its wartime work on radar and other military projects, and by the grants it has since received from many sources towards the establishment and the operation of new research centres and for the reorganisation of its undergraduate and post-graduate teaching work.

For example, in October last, the trustees of the Ford Foundation voted a grant of 9·275 million dollars in support of plans for the revision of the engineering curricula, the preparation of new textbooks and the development of new teaching laboratories for this purpose, the endowment of additional teaching posts and student scholarships. Gifts to the Institute during 1960 amounted to over 17 million dollars, contributing to a present value for its investments of some 175 million dollars.

The student body during the 1960-61 session totals 6,300 of whom about 2,700 are post-graduate. Only about one-third of the latter were undergraduates of M.I.T., the remainder being drawn from other colleges and universities within the United States and from foreign countries. In recent years overseas students have comprised about 12 per cent of the aggregate student body.

The Institute is sub-divided into five Schools, of Science, Engineering, Architecture and Planning, Industrial Management, and Humanities and Social Science, each composed of a number of departments. In particular, the School of Humanities and Social Science comprises departments of Economics, Humanities, Social Science and Modern Languages, and this school plays a central educational role in that its courses occupy some 20 per cent of all undergraduate curricula. With much justification M.I.T. regards itself as a university, but with the important distinction that it has become one in reverse to the traditional pattern of university development—it started with engineering and has grown science and humanities on to this foundation as it has seen its educational needs and defined its objectives with greater clarity.

Centennial—Theme and Prelude

This evolutionary trend is emphasised in the following extract from a statement by the President, Dr. Julius A. Stratton, whom the Institution of Electrical Engineers has honoured this year by awarding him the Faraday Medal.

> " In this Centennial Year, 1961, the future holds out large and awesome prospects to the student at M.I.T. He views a world in flux about him, a world in which the entire economic and social structure appears in transition, a period of new and threatening political alignments, and of rapid advances in the material means and modes of life. Never in recorded history has humanity been swept forward by such powerfully progressive forces of change.
>
> " At the heart of this revolution lies modern science and the products of scientific advance, for it is a revolution—social, political, and economic—that draws heavily upon man's growing capacity to understand and to master his physical environment. And M.I.T., for the very reason that science in the larger meaning has been its central theme, has itself been caught up in a process of growth and transformation. Our expanding interests, the development of new facilities, and the continuing discussions of academic aims and policies reflect the growing opportunities and responsibilities that fall to M.I.T. and its graduates.
>
> " I shall venture to identify, without order of importance, a few trends and movements that appear to foreshadow most significantly the future of the Institute.
>
> " Strong support has been extended to the basic field of science. Mathematics, both for its own sake and as the universal language of analysis, has been one focus of special attention. So have physics and chemistry. The Institute has also entered vigorously into the life sciences, and through the new Centre for Earth Sciences is encouraging the development of a family of fields that include geophysics, oceanography, meteorology, and—in prospect—space physics and planetary science.
>
> " This insistence upon strength at the central core of basic science has been interpreted on occasion as a sign of waning interest in engineering. Nothing could be further from the truth. Wholly apart from our own historical relation to engineering education, there has never been a time when the industrial development of our country afforded a more compelling challenge to the engineer or placed a higher premium upon the excellence of his education. M.I.T. is responding forcefully to this challenge, and the School of Engineering is currently experiencing its most powerful surge since the days of Rogers.
>
> " There will be no lessening in our traditional concern with architecture. New materials and new methods of construction are opening to the architect the physical possibility of new concepts of design. Engineering and architecture contain the potential of an even more fruitful alliance in the future. Modern transportation, moreover, is rapidly altering the face of our cities, and as these changes progress, urban and regional planning, with their ties to civil engineering, economics, political science and sociology, emerge as increasingly significant professional fields.
>
> " There is, indeed, no clearer evidence of the broadening conception of our total mission than in the rapid development of the social sciences over the past decade. M.I.T. now offers advanced degrees in economics and political science, and we may anticipate graduate degrees in psychology within a year or two. In the Department of Humanities a section on the history and philosophy of science is taking form. This entire movement is simple testimony that engineering and science are now inextricably interwoven with the social, political and industrial fabric of our age.
>
> " And finally, in this rapid survey of our current areas of operation, we must take note of the relatively new School of Industrial Management. Whatever may be the benefits of modern technology, it is also without doubt contributing to the rapidly increasing complexity of our society. Consequently many of the most difficult problems of the day—whether in industry, in business, or in government—are jointly problems of engineering and management. Perhaps it is not too much to suggest that, for want of an understanding of the nature of organisation and management, the entire structure of our democratic, industrial society may break down of its own overwhelming complexity. For these and other important reasons, there is no question that this is an area of proper concern for M.I.T.
>
> " In sum, the Institute at the end of the century remains true to the idea of a central core of science and engineering, but the progress of science itself is leading us far beyond our initial, rather limited, technological base. And there is an evolution in process, also, in the aims as well as the content of the undergraduate years. M.I.T. is committed to the education of professional men and women, rather than to the training of technicians. No one will seriously contend that it is any longer possible to complete such a task in four years. Consequently, there is an increasing emphasis upon the fundamental disciplines that underlie all scientific fields, an increasingly serious attention to the humanities and social sciences, and a greater freedom to defer the final selection of a professional major. The undergraduate years constitute a unit or entity in the total educational experience. They afford not only a firm foundation for advanced work in any field of science or engineering, but provide also an excellent preparation for such other professions as medicine or law. More and more students are destined in the future to go on to a graduate degree. Nonetheless, let us keep in mind that the

bachelor of science degree from M.I.T. will remain in itself ample evidence of a sound education in an age of science.

"Research is an activity which strikingly distinguishes the present M.I.T. from the past. Many an undergraduate views the research laboratories of the Institute as an almost hostile influence, competing with him for the interest and attention of the faculty. He is comforted very little by the explanation that the functions of a university are both to learn and to teach, to advance knowledge as well as to transmit learning. There is, in fact, much more to the problem than is expressed by that rather time-worn phrase. For science—and I now use the word in its larger sense—is thrusting forward on every front with a most extraordinary vigour and speed. One is either a part of this movement or is left behind. This is true for institutions, and it is true for individuals. Research is more than the advancement of knowledge for its own sake—it is, for a faculty, the process of keeping pace, of keeping intellectually alive and in the vanguard.

"Most human institutions, including universities, can grow old and sclerotic. But universities have two singular advantages for the retention of vigour. One is the constant influx of ideas and new perceptions that enter through research; the other is the constant renewal of youth itself through students. A university without research stagnates; and an institute for research, without students and a sincere concern for teaching, may also go to seed. Our own aim should be a common involvement of faculty and students in the dynamic process of learning and teaching."

Research

The President's remarks about research are of special interest since the outstanding characteristic of M.I.T. during the post-war period has been the scale and character of its research activity. This is a composite, in the chosen fields, of strictly academic work and the kinds of investigation which in the United Kingdom are to be found in the Research Associations, in the D.S.I.R. and in the research and development establishments of the Services. During last year the cost of the sponsored research work alone amounted to over 66½ million dollars.

Whatever be the demerits and the impracticabilities of the M.I.T. arrangements from our point of view, it must be recognised that they have stimulated a degree of interdepartmental collaboration and created a partnership with the outside world, the comparative lack of which constitutes a serious weakness in our system, and which it is important we should remove as quickly as possible in a way yet to be devised.

In addition to the research facilities provided within individual departments, there exists a number of interdepartmental laboratories whose activities freely cross the boundaries of the traditional disciplines. Thus the staff and post-graduate students of the Research Laboratory of Electronics are drawn from electrical engineering, physics, chemistry, mathematics, economics and modern languages, and the present research topics include statistical communication theory, noise, properties of speech signals, radio propagation, communication biophysics, neurophysiology, translation of languages by machines, switching processes, control systems, physical electronics, low-temperature physics, atomic beams and electron spectroscopy. Other similar laboratories, in some of which Harvard is a partner, are devoted to computation, communication science, nuclear science, materials, particle acceleration, urban studies and international studies. In addition, M.I.T. administers, with support from the armed services, the Lincoln Laboratory which is engaged on large-scale investigations for defence purposes.

It is evident that the widespread changes now being made in the undergraduate engineering curricula have arisen from the inter-departmental character of these laboratories, and we shall be wise to note this consequence without necessarily agreeing with the changes in full detail or with the research arrangements from which they have originated.

Centennial Conference

The first five days of the centennial week were devoted to an international conference on scientific and engineering education. The participants in it numbered about one hundred invited scientists and engineers drawn from the United States and 30 other countries. They were divided into four groups to discuss the following questions:—

(1) *The Problems of Scientific and Engineering Education in Newly Developing Countries.* The British participants in this group were Professors Blackett and Salam, of Imperial College.

(2) *The Problems of Scientific and Engineering Education in Countries with More Advanced Technologies* in which the British participants were Sir John Cockcroft, Prof. Baker, of Cambridge University, Prof. Peierles, of Birmingham University, and myself, and for which I had been invited to prepare one of the five background papers.

(3) *Interactions of Science, Engineering and Society* for which Sir Eric Ashly, Master of Clare College, Cambridge, prepared a background paper entitled "The Administrator—Bottleneck or Pump?"

The main themes presented to this group are worth quoting in detail. They were (in American phraseology): "Given a world in which science and engineering will inevitably play such a large part, what measures are to be taken so that citizens can steer technology instead of having it steer them? The problem has at least two prongs.

"One of the theories of a good society is that the citizenry shall be able to judge issues wisely, that it be sufficiently informed about them to judge without aid, or sufficiently intelligent about them to distinguish between the claims of partisanship. Has the complexity of the modern world made this original theory obsolete? If so, what are the alternatives? If it is not so, how are the lay citizens to be adequately educated so that they may comprehend economic and other technical issues; and particularly scientific and engineering issues? Can these be explained to citizens who are educated as we now are? Could they be explained if the education of citizens were different? Has this any bearing on other questions besides those of participative citizenship—philosophical, for example? In short, what do laymen need to know about science and its applications? And how can they be taught this as they go through present types of education, in school, in the processes of adult education?

"On the other hand, there are questions concerning the education of the scientists and engineers themselves in the areas which are not scientific. Do their new responsibilities of a managerial and political sort find them in any serious way unprepared by their education? Are they any more naive than any one else in matters of social or political conduct ? Can they learn anything useful from formal exposure to the disciplines that study such matters ? Or must they learn what they need to learn only through experience ? Engineering education has taken the position that something must be attempted along those lines and thus curricula have contained subject matter in the humanities and the social sciences. Has this really been meaningful ? Could it become so ?

" In the end, both questions merge in the large question of how the most educated members of society who are the specialists of all sorts can find it possible any longer to communicate with each other and whether any formal measures of curricular or university organisation can in fact improve the present situation."

(4) *Implications of Science and Engineering for International Relations.* Here, the United Kingdom was represented by Nigel Calder, the scientific journalist, the Rt. Hon. Philip Noel-Baker, M.P., and Sir Solly Zuckerman, chairman of the Defence Research Policy Committee.

The themes presented to this group were:—

> " The essential base for a modern society is the application of science by engineering, medicine, and the like. The applications are not amoral. They can be directed to increase the material well-being of peoples; they may also be employed to create more efficient armaments which, in the complexities of competition between nations, have potentialities for universal destruction. The policies of governments are therefore increasingly dependent on technical possibilities available to them.
>
> " Clearly, as societies become more interdependent, an increasing number of bases for world loyalty and identification, as opposed to national loyalty and identification, may be imperative. If this is true, radically new criteria as to the responsibilities of governments must be developed and accepted, initially by peoples of the technically advanced areas, but ultimately by all. Regardless of the validity of these particular conclusions, they suggest many avenues for fruitful exploration.
>
> " What are the implications for education of the extent to which technological progress is increasingly influencing the course of international relations and the evolution of societies ? What are the responsibilities of scientists and engineers to understand the impact of technical developments on political forces ? How can technology be fruitfully applied to the solution of international problems ? How can scientists and engineers contribute to world understanding and co-operation ? What kinds of professional associations between societies at different stages of economic development are most constructive ? What are the lessons of the U.N. Atoms for Peace conferences, the International Geophysical Year, C.E.R.N., and other enterprises ? "

Sir John Cockcroft receiving the 1961 Atoms for Peace Award from Dr. James R. Killian

These themes raise difficult issues, and it was not perhaps surprising that much of the discussion of them was discursive and inconclusive. But the same questions will need to be asked many times again in the years ahead, and we may look forward with interest and hope of enlightenment to the intended publication of summaries of the discussions on them, alongside the various background papers.

The concluding event of the Conference, and one which gave great satisfaction to the British representatives, was the presentation to Sir John Cockcroft of the 1961 Atoms for Peace Award of 75,000 dollars and a gold medallion.

Centennial Celebrations

Friday, 7th April, the opening day of the celebrations, was made another memorable occasion for the British participants by the evening address of the Prime Minister, Mr. Harold Macmillan. The immediate audience of over 3,500 was supplemented by at least an equal number in several enormous marquees.

Saturday was devoted to a series of addresses in three auditoria under the following heads:—(1) How has science in the last century changed man's view of himself; (2) The future of the arts in a world of science; (3) The future of the physical sciences; (4) Arms control; (5) The life of man in industry; (6) The future of life science. The British speakers were Aldous Huxley in (1); Sir John Cockcroft and Professor Peierles in (2); The Rt. Hon. Philip Noel-Baker in (4); and Professor Medawar, of University College, London, in (6).

There followed evening banquets to the alumni and to the official delegates and guests, with an address at each by Dr. James R. Killian, Chairman of the Institute.

The concluding day, Sunday, was made by far the most colourful of all by the Academic Procession and Centennial Convocation, addressed by the President, Dr. J. A. Stratton, on which occasion I was privileged to represent the British Institutions of Civil, Mechanical, Electrical and Chemical Engineers, and Professor Baker to make a short speech of greeting on behalf of the world universities.

At the end of a week devoted to the consideration of various aspects of the ingenuity of scientists and engineers, one could not but admire the creativeness of those of a different persuasion who had designed the varied academic regalia of the universities of the world which were displayed on this auspicious occasion.

In all, the week was a great experience in international relations. The variations in point of view and in emphasis which were revealed in the discussions and addresses and the difficulties experienced by the respective groups in their attempts to extract issues on which general agreement could be achieved, made evident the hazards that must be associated with similar meetings on political questions. But they also made evident the great service which M.I.T. had performed in organising under such pleasant and friendly auspices an international gathering to discuss the outstanding problems of scientific and engineering education, and the sociological consequences and implications of scientific and engineering progress. We in the highly-developed countries carry a heavy responsibility for assisting the under-developed ones to pass safely through the difficult phase of their evolution which lies immediately ahead of them; and we must be prepared to devote a greater proportion of our resources, in money and in service, to this vitally important matter.

Engineering, Marine, Welding and Nuclear Equipment

SURVEY OF THE CURRENT EXHIBITION AT OLYMPIA

OVER 500 exhibitors are taking part in the twenty-third biennial Engineering, Marine, Welding and Nuclear Energy Exhibition, which was opened yesterday at Olympia, London, and will continue until 4th May. The times of opening are from 10 a.m. to 8 p.m. on 1st, 2nd and 3rd May and 10 a.m. to 6 p.m. on all other days. The exhibition occupies the whole of Olympia, consisting of three halls and galleries and includes a separate welding section of 43 stands occupying the ground floor of the Empire Hall. Nuclear energy first appeared in the title of the exhibition in 1957. Since then, a large number of companies have become involved in this branch of engineering and as a result, nuclear equipment of one sort or another is to be found on a large proportion of the stands.

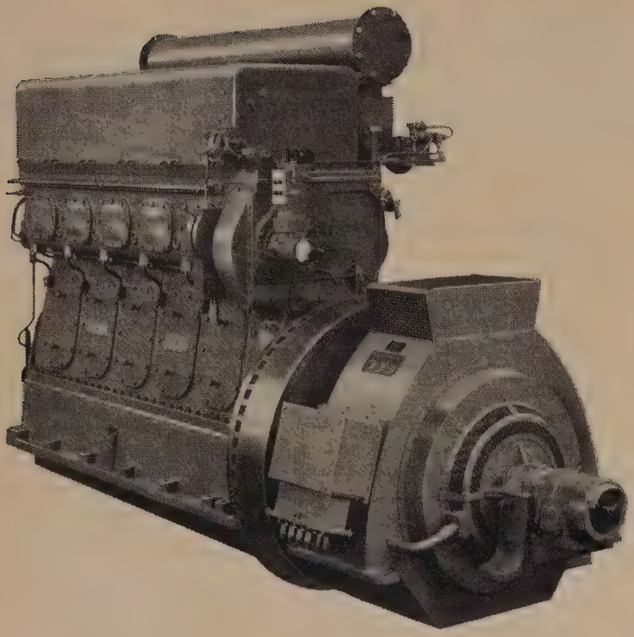
The largest diesel engine ever to be shown at Olympia, weighing 91 tons, is being exhibited by Hawker Siddeley Industries and dominates the National Hall, while in the Grand Hall there is a model of an 885 ton, 25,200 h.p. Burmeister & Wain diesel engine, claimed to be the largest ever made. The English Electric Co. are showing a complete British Railways type 1 diesel-electric locomotive weighing 72 tons and with a length of 46ft 9in. The evolution of the internal combustion engine is the theme of the display by Shell-Mex and B.P. on the stand of Shell Industrial & Marine Lubricants. The theme, which is developed in a mural, has been adopted to mark the centenary of the conception by Otto in 1861 of the four-stroke cycle principle.

The Admiralty are illustrating some of the more specialised engineering requirements of the Royal Navy. The threat of nuclear warfare has necessitated the introduction of automatic and remote controls and this is demonstrated by a working “ mock-up ” of a machinery control room, similar to that being fitted in H.M.S. *Devonshire,* the first of the new guided missile destroyers. A feature of this display is the combined arrangement of steam and gas turbines. The gas turbines can be used for manœuvring or can boost the steam plant by a synchronising clutch. One of the inherent problems in naval design is that machinery must be capable of withstanding shock due to explosion. A short film shows how an electric light bulb can survive when resiliently mounted. Machinery noise transmitted through the hull of a ship can be easily monitored by listening enemy submarines and although this noise cannot be entirely eliminated, the effect of resiliently mounting an electric motor is demonstrated.

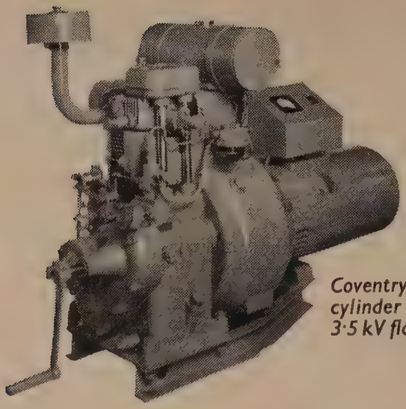
A 6ft-long model of the nuclear submarine *Dreadnought* is being exhibited on the Murex stand. Over a million of the company’s electrodes were used for the manual arc welding in the vessel’s construction.

In an article of this nature it is obviously impossible to describe and do justice to all the equipment or even

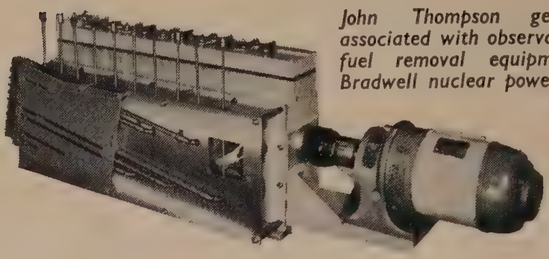
A 1,000 h.p. 72-ton English Electric diesel-electric locomotive arriving at the Exhibition. It was built at the Robert Stephenson and Hawthorns works



W. H. Allen 250 kW dual-fuel generator set which includes a self-regulating alternator



Coventry Victor air-cooled single-cylinder diesel engine with 3·5 kV flange-mounted alternator



John Thompson gear box associated with observation and fuel removal equipment for Bradwell nuclear power station

mention all the 500 firms who are taking part in the exhibition. We must, therefore, confine our further remarks to some of the more outstanding electrical exhibits among the thousands of items to be seen at Olympia.

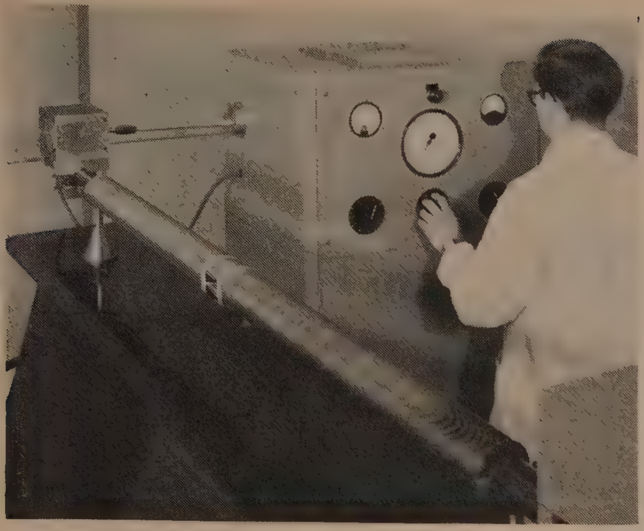
Nuclear Energy

A model of the 580 MW nuclear power station being erected at Sizewell (Suffolk) is being displayed on the Babcock & Wilcox stand by courtesy of the English Electric, Babcock & Wilcox, Taylor Woodrow Atomic Power Group. The Nuclear Energy Trade Associations' Conference (N.E.T.A.C.) is represented on the stand of the British Engineers' Association, where the starting up of a nuclear power station is demonstrated on a reactor simulator. A selection of films concerned with nuclear energy is also being shown on this stand. Short Brothers & Harland are showing a quarter-scale model of the reactor simulator with 200 amplifiers and an overall component error of less than 0·1 per cent, which is being installed by the United Kingdom Atomic Energy Authority at their Calder Operations School. The machine has been designed to simulate the behaviour of a complete atomic power plant of the Calder Hall type, but it can be modified to simulate the advanced gas-cooled reactors. A mock reactor control desk, similar to those being supplied to the new civil nuclear power stations, will be used with the simulator. The instruments on the desk will receive their information from the simulator, which will also interpret any control adjustment made by the trainee operator and revise its signals to the desk instruments accordingly.

Exhibits on the Richardsons, Westgarth & Co. stand include various products developed for the Trawsfynydd nuclear power station. These include a new type of restraint mechanism, consisting of large numbers of high-tensile rods, grouped in two assemblies around the periphery of high-temperature or high-pressure pipelines. It will be used for the first time with conventional bellows convolutions on the cooling gas ducting of Trawsfynydd power station. A CO_2 blower rotor is also displayed and a colour film is being shown depicting the progress at Trawsfynydd. The main feature of the Darlington Forge stand is a five-ton forged gas duct reinforcement ring similar to several that have already been supplied for use at Bradwell power station. The John Thompson Group are showing a control drive gearbox for observation and removal equipment at Bradwell.

Nuclear exhibits by the Talbot Stead Tube Co. include breeder thermocouple guide tubes and a model of a stainless steel control rod with boron inserts. The company is also showing a model of a mild steel charging stand pipe, whose upper part consists of a concrete-filled outer tube containing four inner tubes, while the lower part is made up of a large tube with a smaller tube attached to its wall. A resonance bending fatigue machine for investigating the fatigue strengths of tubes and welded joints is demonstrated in action by Stewarts & Lloyds. The machine is used for testing the tubes of nuclear boilers which are subject to vibrations set up by the gas flowing over them. A CO_2 circulator for nuclear test rig applications is being shown by Plannair. This unit, with its 1,500 r.p.m. motor, is designed to work from normal atmospheric pressures to 300 p.s.i., temperatures up to 350°C, and mass flows covering a range up to 8,000 lb/hr. Impermeable graphite tubes, made by impregnation with furfuryl alcohol, followed by graphitisation at 1,000°C, are being shown by the Hawker Siddeley Nuclear Power Co.

A variety of instruments employing nuclear radiations can be seen on the Canadian Government's stand. Atomic Energy of Canada, Ltd., are showing the "Gammacell 220" irradiation unit which has a fixed source of up to 54 rods of cobalt 60, arranged in squirrel cage formation around a 6in diameter by 8½in high irradiation chamber. The chamber can be raised and lowered electrically to receive specimens for irradiation. The unit is fitted with safety interlocks and as it is fully shielded, no external shielding or manipulators are required.



Resonance bending fatigue testing machine which is being shown by Stewarts & Lloyds

On the same stand Electronic Associates, Ltd., are showing a model railroad, to illustrate the use of their vehicle identification system, which automatically indicates the position of every train in relation to check points on the main line and sidings. It shows when the whole of a given train has entered a certain section and identifies the train by the number of the leading locomotive. It also shows the direction in which each train is travelling as it passes the check point. The system comprises a small steel box containing radioactive materials mounted on the locomotive. Gamma rays emerge from the bottom of the box in a pattern individual to that vehicle and a gamma-ray detection device is placed between the rails at each reading point. Also displayed on the Canadian Government's stand is a selection of scintillation counters produced by Nuclear Enterprises, Ltd., from their new low cost plastic phosphors. These plastics can be machined to intricate shapes and are offered in large sizes not available with conventional crystals.

Industrial Steam Plant

The central exhibit on the International Combustion stand is a sectioned scale model of the 550 MW boiler unit for Thorpe Marsh power station. The Babcock & Wilcox display illustrates, by drawings and animated diagrams, the function and principle of operation of digital computer control as applied to one of the Babcock 200 MW boilers now being installed at West Thurrock power station. The development of power station boilers to the present stage of a single boiler to serve a 550 MW turbo-generator or to operate at supercritical pressure, with overall station thermal efficiencies of the order of 40 per cent, is indicated in an animated display and a progressive series of models of typical power station boilers of different periods over the last 70 years. A working model demonstrates the new high-capacity Babcock coal pulverising mill developed especially to meet the spectacular increase in the size and capacity of modern power station boiler units. Because of its much larger output, as much as three times that of previous mills, fewer mills per boiler are required, with important savings in floor space and simpler pipework, ducting and controls. Wear and maintenance are reduced by new design features which include large-diameter grinding balls and low-speed rotation.

Hagan Controls are showing a range of entirely solid state analogue computer control systems, known as "Powr-Mag" systems. They are designed to complement digital computer control and employ magnetic amplifiers in an electric analogue technique. Applications include centralised plant control systems requiring direct tie-in with data processing equipment.

A new range of rotary electric actuators for the automatic control of valves in power stations is being shown by English Electric. The first units are to be installed at Blyth "B" and Rugeley power stations. These actuators can be used as individual components or as part of a complete control scheme. Visual indication of the open, shut or intermediate position of the valve is given on the actuator, with provision for remote indication and control. The actuators are operated by a 415 V, three-phase, 50 c/s induction motor designed with high torque and low inertia characteristics. A "hammer blow" effect for moving a sticking valve is given by an incorporated lost motion mechanism, which allows the motor to run up to full speed before transmitting torque to the valve spindles.

A new approach to desuperheating, which was introduced at the last Engineering, Marine, Welding and Nuclear Energy Exhibition, is again being displayed by Copes Regulators, Ltd. This variable-orifice desuperheater consists of a chamber containing a weighted ball held over an orifice in the steam main at a point where the steam flows vertically upwards. Cooling water enters a trough surrounding the orifice where it meets steam travelling at its highest velocity which causes extreme turbulence thus breaking up the water into minute particles which readily vaporise.

A model of a glassfibre condenser water box for use in areas where cooling water would cause graphitic corrosion of cast iron is being shown by Associated Electrical Industries (Turbine-Generator Division). A cooling water circulating pump, shown by Gwynnes Pumps, is one of a batch of six with 33in discharge and suction branches. The pump is designed for a capacity of 33,000 gal/min against a total head of 55½ft when running at 590 r.p.m., driven by a 620 h.p. motor. The casing is of cast iron, the propeller is of stainless steel and mechanical seals are incorporated. The main exhibit on the James Howden stand relates to the company's electrostatic precipitators.

Diesel Generating Sets

A 250 kW dual-fuel engine-driven generating set is being shown by W. H. Allen, Sons & Co. The five-cylinder engine is arranged for continuous operation on natural gas with only the minimum requirement of liquid fuel which in service will be crude oil. The alternator is of a self-regulating type equipped with static excitation equipment and having a full-load rating of 250 kW at 0·8 power factor. Its transient voltage response characteristics are superior to those of the conventional alternator and it is thus better able to deal with the loads represented by direct-on-line starting of relatively large induction motors. The engine is arranged for remote pushbutton starting, a feature being that all essential services such as cooling water, fuel, lubricating oil and starting air must be properly available before the starting cycle can be completed. Following start-up, separate alarm and shut-down circuits automatically become effective. The Coventry Victor Motor Co. are showing a type A.D.3 air-cooled single-cylinder 5/8 b.h.p. diesel engine with a flange-mounted 3·5 kVA alternator in unit construction.

The a.c. generating set shown by Davey, Paxman is rated at 391·25 kVA at 1,500 r.p.m. It is powered by an inter-cooled pressure-charged eight-cylinder type RPH engine of 454 b.h.p. coupled to a brushless salient-pole generator with a three-phase, 50 c/s output. Leyland Motors are showing a 145 kVA diesel generator set comprising a six-cylinder engine with a short-time rating of 222 b.h.p. at 1,900 r.p.m. and capable of delivering 193 b.h.p. at 1,750 r.p.m. on a 12 hr rating.

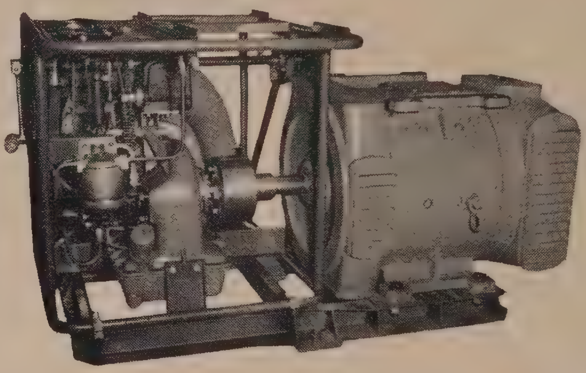
One of the 15 kVA Trifidra ES "no-break" emergency generating sets is being shown by Ad. Strüver, K.G., of Hamburg. With mains electricity in operation, the generator is driven by an asynchronous electric motor developing 25 h.p. On mains failure, a large flywheel keeps the plant in operation until the air-cooled 25 h.p. two-cylinder Deutz diesel engine has been started. This engine then drives the generator through a magnetic clutch and continues to operate until the mains supply is restored.

Gas Turbine Generator Sets

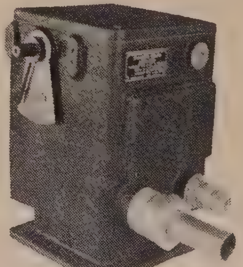
A Jupiter gas turbine coupled to a 330 kW Smit-Slikkerveer d.c. generator can be seen on the Perkins Group's stand. The Jupiter turbine is rated at 525 b.h.p. and is fitted with a combustion air starter capable of starting the engine in 10 sec. The 220 V, 1,500 A generator is flexibly coupled to the turbine output shaft and runs at 1,800 r.p.m. An integral housing contains the control gear and the whole machine, which weighs about 4½ tons, is finished to tropical standards with Class B insulation. The set can be started by remote control and electric starting can be supplied in place of the combustion starter. It is claimed that large load changes can be accepted by the engine with only small variations in speed. A Perkins Mars gas turbine driven d.c. generator set can also be seen on this stand. Rated at 30 kW, the overall weight of the set is 875 lb. The generator is of Lancashire Dynamo & Crypto manufacture and a clutch is provided to enable the inertia of the generator to be out of engagement during hand cranking of the set.

The Bristol Siddeley exhibits include a model of the 3 kW Proteus gas turbine remote-controlled generating set in both static and mobile forms. A model of the 15 MW gas turbo-generator set, powered by an Olympus engine for Hams Hall power station, is also shown. The Austin Motor Co. are also showing a gas turbine generator set. This set was first shown at the Electrical Engineers Exhibition last month and was referred to in our issue of 24th March.

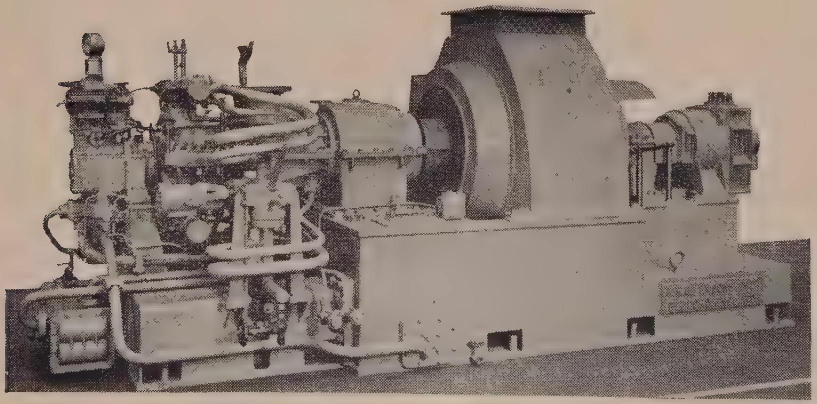
An automatic speed synchronising unit is being demonstrated by Dowty Rotol. The equipment consists of a small three-phase alternator fitted to each engine to be synchronised, including the selected "master" engine. A corrector motor is incorporated in the control system of the slave engines. An electric load sensing governor is included in the exhibits on the Ardleigh Engineering stand; it has been developed for use with a.c. sets when driven by any type of prime mover. Engine speed is sensed by a permanent magnet pilot alternator, which is also used as a power source for the amplifier while a load sensing device, driven by current transformers and alternator phase voltages, produces an output signal proportional to the kW load. These two signals are combined and amplified to a suitable level in a magnetic amplifier unit. The output of the amplifier is then fed into the throttle actuator which consists of an electrically-operated transducer, which produces a mechanical movement proportional to the output of the amplifier unit. Thus, when a load change occurs, the throttle setting is altered by the load sensing signal and if a speed change should occur, a



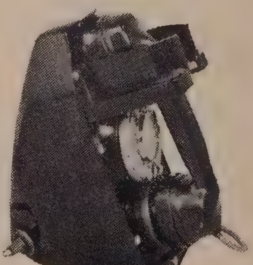
50 h.p. Perkins "Mars" gas-turbine driven d.c. generator



The electro-hydraulic servo actuator (left) is used in the Ardleigh Engineering electric governor system which is suitable for any type of prime mover

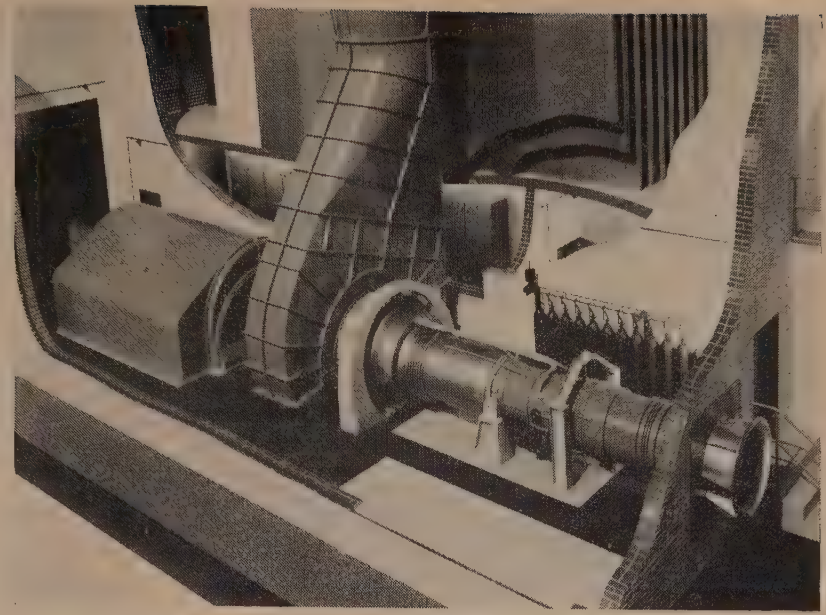


W. H. Allen 750 kW marine type back-pressure turbo-generator

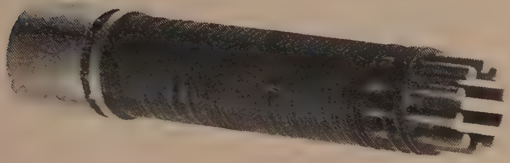


Right: Extra strong telephone developed by Standard Telephones & Cables for the Admiralty

The new Decca 16in true motion display console



Model of the 15 MW Bristol Siddeley "Olympus" gas turbo-generator set for Hams Hall power station



Patented construction of the rotor of a 1·8in diameter, 7in long, two-pole, three-phase, induction motor shown by H. Williams & Son

correction is applied by the permanent magnet alternator signal.

Marine

The 750 kW high-speed steam turbo-generator shown by W. H. Allen, Sons & Co. is one of two similar units for installation in a 37,000 ton P. & O. tanker. The 13,500 r.p.m. turbine is designed for operation with steam at 575 p.s.i.g. and 830°F, exhausting to 20 p.s.i.g. The 440V, three-phase, 60 c/s, 1,800 r.p.m. alternator is driven through a flexible coupling and an Allen-Stoeckicht planetary, double-helical epicyclic gear. A 331 b.h.p. eight-cylinder turbo-charged inter-cooled diesel engine, flange connected and flexibly coupled to a Campbell & Isherwood compound-wound 220 kW d.c. generator, is being exhibited by Rolls-Royce. Another diesel generating set being exhibited by Rolls-Royce consists of a 301 b.h.p., 1,800 r.p.m., eight-cylinder diesel engine coupled to a MacFarlane self-regulating alternator. Three of these sets are to be fitted in the Union Castle liner *Transvaal Castle,* launched earlier this year. The three sets will provide emergency power, one being arranged to start through an automatic control panel, provided by Petbow, Ltd., on failure of the ship's main supply.

The Sperry Gyroscope stand includes a replica of a ship's wheelhouse, which contains a console incorporating a representative range of instrumentation and tiller pilot automatic steering. Port and starboard hand/electric tiller steerers are also included. A working model of an electro-hydraulic servo system for ship's steering is also being shown by Stein Atkinson Vickers Hydraulics, Ltd., while Bloctube Controls are showing a wheelhouse console incorporating duplicated hand/electric steering controls for an electric/hydraulic steering engine.

New exhibits on the Decca Radar stand include a 16in display console which incorporates the interscan technique for rapid measurement of range of bearing. Also shown are units from the new Decca TN-S2400, the first British commercial marine radar to operate on the 10 cm wavelength (S-band). Marine radio navigational aids shown by the International Marine Radio Co. include the new "Adsum 4" automatic visual direction finder.

Among the cargo winches shown by Laurence, Scott & Electromotors is the "Corrector" unit for use in ships with a.c. mains. This self-contained winch incorporates a lightweight motor-generator set, supplying the winch motor on the Ward Leonard variable-voltage system. Included in the Clarke Chapman exhibit is a new three-speed a.c. cargo winch. Electrically-driven windlasses and capstans can be seen on the Telegraph Construction & Maintenance Co.'s stand, while Felco Hoists are displaying their range of hand- and electrically-operated hoists.

A number of new designs of weatherproof plugs and sockets for marine applications can be seen on the stand of Clang, Ltd. F. A. Hughes & Co., Ltd., are showing the "Capac" impressed current system of hull protection. This system, with fully automatic control, has been developed by Engelhard Industries, Inc.

Motors

A new variable-speed reversible a.c. motor shown by Mawdsley's has a speed range from zero to 3,000 r.p.m. with constant torque. Full-load starting torque is exerted with only 30 per cent full-load current drawn from the mains, while regenerative braking is an inherent feature. This company is also showing a 75 h.p. "Mawdomatic" motor-generator set and work motor for dockside cranes. H. Williams & Son exhibit high-speed motors made by the C. Oberg Machine Co., of Sweden. The motors are of two-pole three-phase squirrel-cage construction and run on 42/50 V and have outputs of up to 600 W. The speed range is between 27,000 and 70,000 r.p.m.

A new direct-on-line 5 h.p. contactor starter for both single- and three-phase motors is featured on the A.E.I. stand by the Motor & Control Gear Division. These units incorporate single-phasing protection on a three-phase supply and an ambient temperature compensator to allow for differences in local temperature at the starter and motor. The starter is normally supplied with one of five coils and there is a range of 15 overload heaters from which one can be chosen to give precise protection to the motor. A sensitive overload protection relay unit applicable to any motor-driven machine tool is being shown by the British Federal Welder & Machine Co.

A transistorised digital frequency and time interval meter is being shown by Southern Instruments. Unknown frequencies between 0·1 c/s and 120 kc/s may be measured using count periods of 0·1, 1 or 10 sec. British Arca Regulators are showing a new electronic disc chart recorder, while linear displacement transducers are being shown by Wynstruments, Ltd.

Bayham, Ltd., are exhibiting their new type 1810 level gauge switch for fitting to small tanks where liquid swirl is likely to be present, particularly in traction and marine installations. The switch itself is of the mercury tube pattern; it moves through 90° so that float arm oscillation through liquid surge caused by pitching and rolling does not cause intermittent operation.

Heating

The Tabulair Division of the Spiral Tube & Components Co. are showing the "Tabulair" built-in heater. This 2 kW fan heater is suitable for building into a shelf, room divider, etc. A silicon carbide heating element, 2$\frac{1}{6}$in in diameter and 72in long, rated at 30 kW at 1,300°C, is being shown by the British Resistor Co. A working model of the Birlec sealed quench furnace, displayed by A.E.I.-Birlec, Ltd., shows the complete operating cycle and the latest features of this furnace, including the new horizontal radiant tubes. The main exhibit on Garrington's stand is an automatic induction billet heating unit designed to heat steel billets from 1in to 2in square to a temperature of 1,250°C at a production rate of 2,000 lb/hr. A feature of this heater is the continuous billet feed which eliminates electrical fluctuations by giving constant billet conditions within the heating coils. The feed device consists of a vibrator conveyor.

Welding Equipment

The welding exhibits have been conveniently grouped in a separate section comprising 43 stands on the ground floor of the Empire Hall. In this comprehensive display, a number of manufacturers are featuring new equipment, notably that for inert gas shielded welding. The Sprite CO_2 gas shielded semi-automatic fine wire hand welding unit, shown by the Lincoln Electric Co., is particularly suited to light gauge sheet metal fabrication. The complete equipment, which is being demonstrated, comprises a constant-voltage generator capable of providing 400 A continuously at an arc voltage of 40 V for a 100 per cent duty cycle, the welding unit and a hand welding gun. The unit incorporates an infinitely variable wire drive mechanism, a wire reel with adjustable brake, a spring-loaded mechanism to take up slack wire when the electrode is inched back prior to welding, a remote current control box with a CO_2 gas purge operating button, and a clamp for connection to the ground cable. Wires of $\frac{1}{32}$ and $\frac{3}{64}$in diameter can be fed at speeds variable between 130 and 300in/min. The welding current range is 60-200 A.

The carbon-dioxide welding process is also featured by the Arc Manufacturing Co. The "Actarc" semi-automatic CO_2 welding unit comprises a lightweight water-cooled hand gun, a wire drive and control unit and a 600 A constant potential power source incorporating a silicon rectifier rated for a 100 per cent automatic dry cycle. The rectifier has a voltage range of 0-45·4 V at rated load. There is a built-in 2 kVA, 115-230 V control transformer to provide power for accessories and a fixed 180 A outlet for tack welding with normal stick electrodes. Slope control is provided with five positions giving characteristics varying from 0·6 to 8 V drop per 100 A increase in output current.

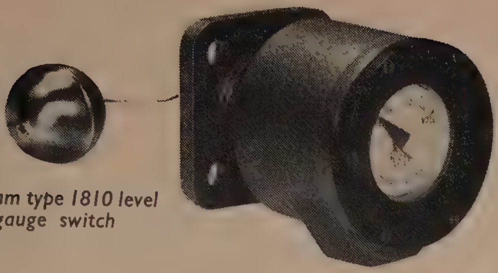
The "Vertomatic" machine for vertical welding of plates having thicknesses of $\frac{1}{2}$in and above, using the CO_2 shrouded arc process, is being shown by Rockweld, Ltd. In this machine two water-cooled shoes box the weld metal between the plates being welded and a CO_2 shrouded arc. It comprises a welding head carriage, mounted on vertical rails, which incorporates the control for vertical movement, the wire feed and the oscillating mechanism which is necessary for welding plates of 1$\frac{1}{4}$in thickness and above. Control of the wire speed, vertical traverse, welding current and voltage and positioning of the weld nozzle are all adjustable by the operator during welding. With this machine a speed of 21ft an hour on $\frac{5}{8}$in plate has been achieved.

Other new equipment on view includes the A.E.I. type DA400 "Paradyne" portable d.c. single-operator welding set. This permits infinitely smooth control from 30 to 400 A and consists of a motor-generator set, control gear, selector switches, motor starter and socket-outlets. The d.c. generator has a drooping characteristic to reduce power loss during welding. This equipment and an a.c. "Thermac" welding set are providing current for demonstrations of hand welding using the company's latest electrodes, including the "Gazelle" for mild steel welding.

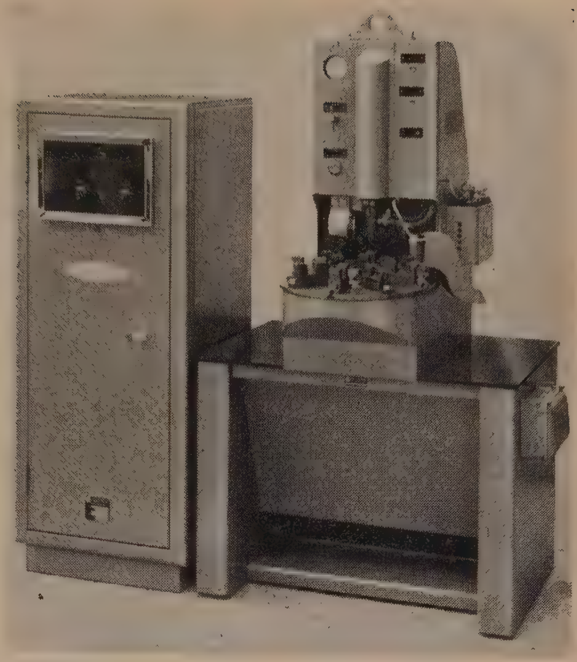
A new range of small lightweight welding generators is being displayed by the British Oxygen Co. There are three versions, driven by either a petrol or diesel engine or an electric motor. All have a mechanical power take-off for flexible-drive tools and a 40 V, 10 A supply for electric tools. Stainless steel, mild steel, steel alloys and titanium can be welded by the S.W.300 argon arc water-cooled 300 A spot-welding torch which is to be introduced this year by the company and is now on view.

The model EFS.250 welding alternator shown by Oerlikon Electrodes (Great Britain), Ltd., is a single-phase machine directly coupled to the shaft of an induction motor. The alternator has a rotating field with permanent magnet pole pieces and stationary output coils. Coarse and fine switches control the 425 c/s output by paralleling the stator windings.

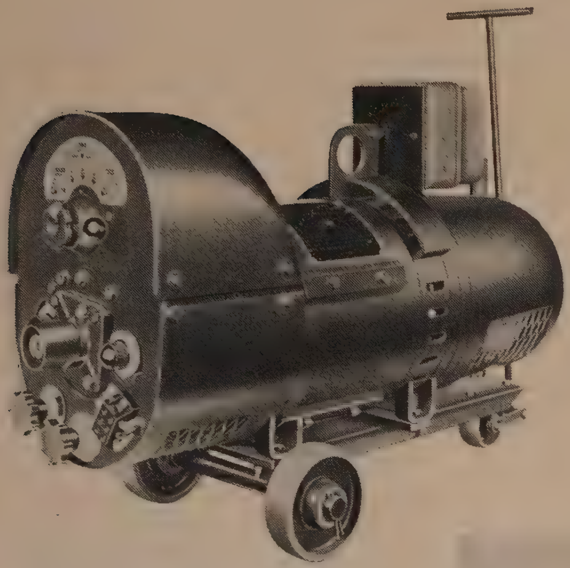
A new control panel fitted with two independently variable heat level potentiometers, which can be pre-set for different combinations of metal gauges, is being exhibited by Sciaky Electric Welding Machines. This permits a single welding gun or pedestal machine to be



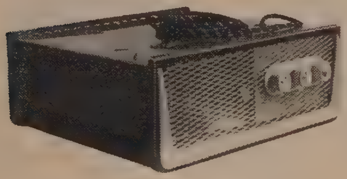
Bayham type 1810 level gauge switch



25 kVA eight-station projection welder for welding silver contacts at up to 1,000 components per hour shown by Hirst Electronic

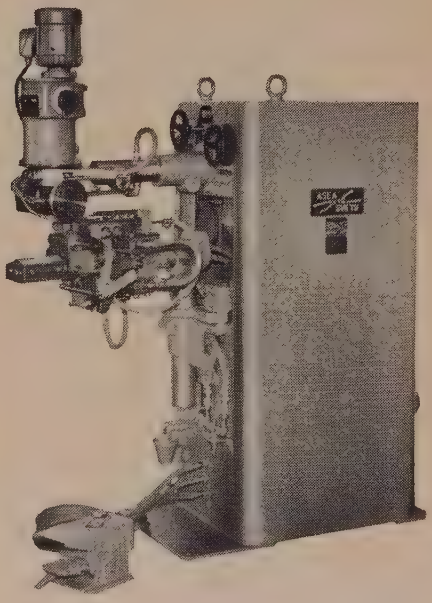


British Oxygen Co. electrically driven lightweight welding machine

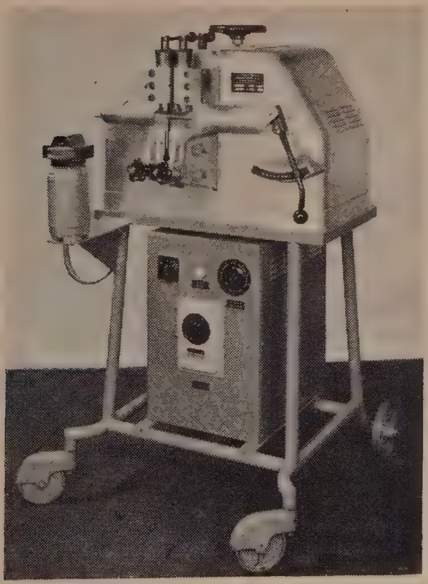


"Tabulair" built-in 2 kW fan heater shown by the Spiral Tube & Components Co.

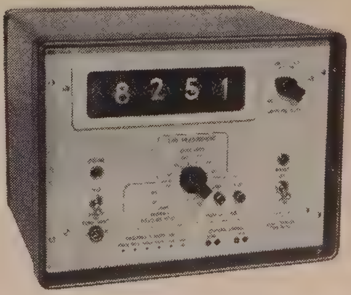
Above: Welding machine for sealing atomic fuel element aluminium cans shown by F. Hirschmann, Ltd.



A.S.E.A. 35 kVA 50 per cent duty cycle seam welder shown by Fuller Electric



Left: Schlatter type M butt welding machine



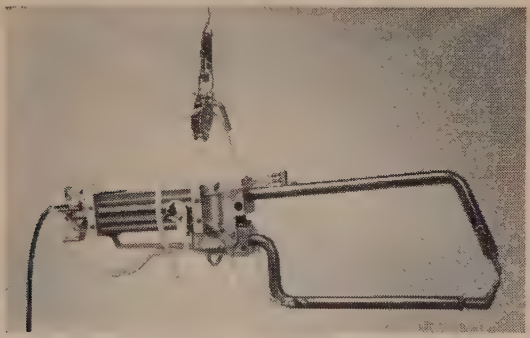
Right: A 100 kc/s counter shown by Southern Instruments, Ltd.

used for operations where varying thicknesses of metal are met. A switch is provided to enable the operator to change the welding heat from the operating position when a different gauge combination is encountered. This Dekatron timing control, model S4, which is a four-stage unit fitted with thermostatically-controlled ignitron tubes, is coupled to a dual-head portable high-speed welding gun unit for this display.

Typical of the products of overseas manufacturers which are on view is the type M butt welding machine for round, square and other sections in iron, steel, copper, brass and aluminium, exhibited by H. A. Schlatter. This machine is suitable for welding cross-sectional areas from 0·019 to 0·209 sq in with iron and steel, 0·019 to 0·109 sq in with copper, 0·019 to 0·178 sq in with brass, and 0·031 to 0·124 sq in with aluminium. The welding ratings at the maximum cross-sectional areas for these materials are 20, 45, 35 and 35 kVA respectively. There are three welding variables which can be adjusted: electrode spacing, welding current and upsetting pressure. The accessories available for this machine include a grinding wheel for burr removal, a wire cutter or abrasive cutting disc for preparing the wire ends for welding, and a transducer control unit to give protracted cooling for use on high-carbon wires.

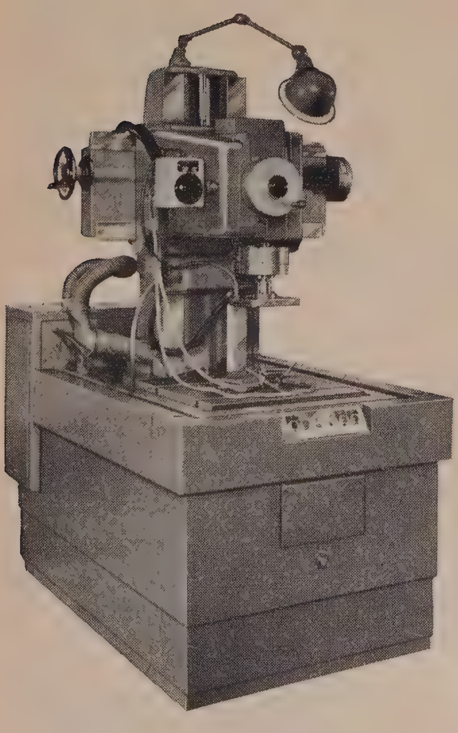
The "Sigma" welder, displayed by Interlas, Ltd., is available in three sizes, with 100 per cent duty cycle welding current ratings of 300, 500 and 1,000 A. These machines automatically provide the correct current to burn off the filler wire at the rate necessary to maintain a constant arc voltage. If the wire feeding speed varies, the welding current output is automatically correspondingly changed to burn off the wire at a rate to maintain constant arc length and/or voltage until the feeding speed returns to normal. The smallest model can be converted for tungsten inert gas or metallic arc welding, with a current range from 3 to 400 A.

Several portable spot welding equipments are on view. The recently-introduced model 407 portable gun, exhibited under operating conditions by the ARO Machinery Co., can exert an electrode force of 660 lb at 70 p.s.i. when fitted with standard arms giving a working throat depth



Model S.120 lightweight spot welding gun exhibited by Portable Welders, Ltd.

Argon shrouded aluminium stud welder as demonstrated by Crompton Parkinson, Ltd.



"Seleromat B" spark erosion machine shown by Solar Weld Languepin, Ltd.

Below : Holden & Hunt 15 kVA spot welding machine

Right: "Sigma" type SCS welder on the Interlas, Ltd., stand of 7in. Interchangeable arms enable throat depths up to 31in to be obtained. The welding capacity in mild steel sheet, using standard arms, is 10+10 s.w.g., or mild steel rods ⅜in+⅜in diameter. The secondary short-circuit current is 14,000 A and the transformer and electrode assemblies are water cooled.

Another lightweight spot welding gun is the model S.120 on the stand of Portable Welders, Ltd. This is rated by the manufacturers on a 20 per cent duty cycle at 10 kVA. The normal rating on a 50 per cent duty cycle to B.S. 3065 is 25 kVA. The gun is normally capable of welding up to 2 by ⅛in mild steel. Production welding on 2 by 16 s.w.g. aluminium is also possible. Standard water-cooled arms available have 8, 12 or 18in reaches and a 4½in throat depth. The equipment has a Class H silicone-insulated transformer, the secondary windings of which are firmly bolted to silver-plated top and bottom barrels into which the electrode arms are fitted. The tip pressures are adjustable by a wheel, up to 600 p.s.i. being achieved on the standard 8in reach arms.

Siemens-Schuckert (Great Britain), Ltd., are showing a representative selection of their R.P.A. series air-operated spot welders which are available from 7 to 100 kVA rating. The arm lengths on these machines vary from 12 to 36in. Self-contained two-, three- and four-stage electronic timers with plug-in connections cater for most operating sequences and high-speed contactor or ignitron control may be specified.

The main feature on the Crompton Parkinson stand is a demonstration bay where argon-shrouded stud welding on light alloys is being shown for the first time. In this process, porosity and atmospheric contamination are reduced by the introduction of argon gas into the weld zone through a brass shroud. A valve attachment at the base eliminates gas wastage by releasing the argon flow only when the tool is in position. This technique can be employed for the complete range of aluminium alloy studs up to and including $\frac{7}{16}$in in diameter. For ½in diameter studs, a current of approximately 70 A for a duration of 3 sec is used to preheat the stud before welding.

Another new technique being demonstrated for the first time in this country is the percussive high capacitance stud welding system to be seen on the Kerry's (Ultrasonics), Ltd., stand. This permits threaded or unthreaded studs up to ¼in in diameter to be welded to thin metals down to 0·02in thickness without distortion or weld burn. The weld is produced by discharging a low-voltage high-amperage direct current through a tip on the stud which initiates the arc on contact with the material. The current flow causes ionisation which melts the stud face and a similar area of the workpiece.

A system developed for the rapid a.c./d.c. arc repair welding of heavy cast iron parts is the "QuenchWeld" process displayed by the Eutectic Welding Alloys Co. This procedure involves preparation with "Chamfer-Trode" grooving electrodes which leave the weld area correctly veed and include stress-relieving grooves, passes with a special electrode which seals in any contaminants in the cast iron, and the use of a third electrode which possesses high elongation and high tensile strength characteristics. This is applied using back-step deposition with immediate quenching after each pass, with a damp cloth or air line.

A new range of low-heat metal-joining alloys called "Obvis" is introduced by Weldcraft, Ltd. With these alloys the bond is achieved by building up a surface alloy between the parent metal and the deposited metal. There is no fusion of the base metal and, therefore, less heat transference to the surrounding metal, permitting lower temperatures to be used.

The "Seirion" device shown by Saturn Industrial Gases is designed for use in conjunction with a d.c. power source to initiate an arc without the necessity of making contact between the electrode and the workpiece. It has been developed specifically for welding stainless steel, nickel chromium alloys, copper and copper alloys by the tungsten inert gas process. It can be used with either an air-cooled or water-cooled arc welding torch. When connected to any d.c. welding supply between 40 and 100 V a series of sparks across the arc gap can be produced. When the arc has struck the voltage falls below the level necessary to generate sparks which then cease. This prevents spark pitting of the weld and prolonged radio interference. If the arc fails, the voltage rises and restores the sparking condition necessary for re-ignition.

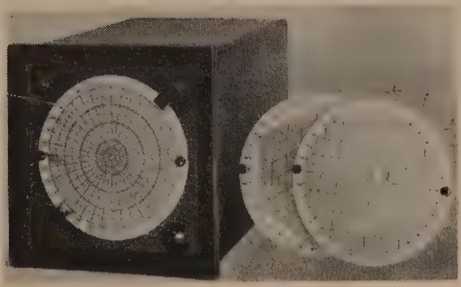
Spark Erosion Machinery

The process of metal machining by spark erosion is becoming popular for certain applications and one of a series of machines produced for this duty is being shown by Solar Weld Languepin, Ltd. This is the "Seleromat B" which has an erosion head mounted on co-ordinate slides providing "jig-boring" positioning of the electrode over the workpiece. The co-ordinate movement dimensions are 9in by 12in. This machine has four erosion rates of 1,000, 140, 9 and 2 cu mm/min, giving a surface finish of 50, 18, 5 and 2 microns to tolerances of 0·004in, 0·003in, 0·001in and 0·0003in respectively.

Flaw Detection

Apart from the range of Andrex portable X-ray units shown by Watson & Sons, this company are exhibiting a xero-radiography unit manufactured by Rank-Xerox. With this type of equipment the sensitive element detecting the X-ray image is a thin layer of photo-conducting selenium on a metal backing plate. This plate is sensitised by giving the selenium surface a uniform electrical charge. On exposure to X-rays, the selenium conducts the charge to the backing plate by an amount depending upon the X-ray intensity, resulting in a pattern of charges which is made visible by blowing charged powder against the selenium. It is then viewed by side lighting in a viewer which screens off ambient light. A built-in 35 mm camera is used to make a permanent record of the image. Portable X-ray equipment is also being shown by Pantak, Ltd.

Demonstrations of ultrasonic and eddy current types of non-destructive testing apparatus can be seen on the Accles & Pollock stand. The new addition to the Ultrasonoscope range of ultrasonic flaw detectors, the Mark II, has a very fast time-base speed and high trace brightness. It has an operational frequency range of ½ to 10 Mc/s and a maximum depth range of 20ft in steel. The Mark 6 ultrasonic flaw detection equipment, as shown by Smiths Industrial Division, has been designed for routine inspection within production units. The equipment operates with barium titanate probes having single, twin or separate transmitter and receiver heads and is suitable for contact,



Vectormeter indicators for the W. & T. Avery electro-dynamic balancing machines

gap or immersion scanning techniques. For longitudinal weld testing, four miniature 70° angle probes are used in the Solus-Schall automatic weld testing apparatus. These probes are used in parallel with an ultrasonic flaw detector and flaw alarm unit.

An electro-dynamic balancing machine with a capacity of 250 lb shown by W. & T. Avery, is fitted with a twin Vectormeter indicator head and plane compensator. A light spot on the Vectormeter is displaced from the centre zero so that the radius at which it settles represents the amount of unbalance, the position on the scale showing the angular location of this unbalance on the rotor. Each Vectormeter consists of two wattmeter instruments spaced at 90°, one arranged to deflect the light spot vertically with the aid of a mirror, while the second acts independently and deflects the light spot horizontally. The indicated result is fixed by an electromagnetic locking device.

The " Mobrey " magnetic safety switch shown by Ronald Trist & Co. is designed for fitting to safety guards of electrically-driven machines. Wired in series with the " stop " button circuit, the switch will prevent the machine being started unless the safety guard is in place, and will break the " stop " circuit should the guard inadvertently be opened while the machine is running. The Wallsend Slipway & Engineering Co. are displaying their flame failure equipment for all types of oil-burning plant. The flame failure unit can also be adapted to give warning of high and low water conditions in the boiler, also failure of primary and/or secondary air supply to the burner, and in all cases the oil supply to the burner is shut off. The system uses a photo-electric cell connected to a sensitive relay.

The high-speed a.c. centrifugal fan shown by the Service Electric Co. can be operated at speeds up to 11,000 r.p.m. It is belt driven from an a.c. induction motor and has an automatic belt-tensioning device. By this means the fan gives a similar performance to that of a high-speed series commutator motor-driven fan. Keith Blackman, Ltd., is showing a 23in marine type axial fan with d.c. totally enclosed motor. The fan casing has twin watertight access doors adjacent to the motor to facilitate servicing.

A new device shown for the first time by Twinflex Couplings is an intermittent drive unit. This compact unit will produce an intermittent motion from a constantly rotating power source by means of a single revolution clutch.

The principal exhibit of LimiTorque Valve Controls, Ltd., is a Grove " Seal-O-Ring " through conduit valve driven by a LimiTorque actuator type SMA.3-60. The Laurence, Scott motor for the actuator is operated by a proportional control unit manufactured by Newman Industries. The control and position monitoring units are energised by the out-of-balance voltage between two similar potentiometers. This causes a relay to operate either for opening or closing the contactor of a direct-on-line Electrical Apparatus Co. reversing starter thus rotating the actuator motor in the required direction. As soon as the potentiometer circuit is balanced, the motor automatically stops in the desired position. The control circuit incorporates specially designed positively driven limit and torque switches, which prevent over-run at each end of the valve gate travel; the torque switch also opens in the event of a foreign body being trapped by the valve gate whilst closing. The control system incorporates a fail safe signal which comes into operation should a transmission line fail. This working exhibit can be operated by visitors. Tensator, Ltd., are showing an electric cable retriever reel which uses a Tensator B motor constant torque spring.

Conductive Material Resistance

RUBBER and plastics can be converted into conductors of electricity by the incorporation of carbon black or other appropriate ingredients. Previous editions of B.S. 2050 " Electrical Resistance of Conductive and Anti-Static Products made from Flexible Polymeric Materials " dealt only with products deriving their conductivity from carbon black, but a new version also covers those, including plastics, which derive their conductivity from other substances. Limits of electrical resistance and methods of test for 24 products are specified. Among the goods dealt with are anæsthetic equipment and other articles for hospital use; floor-covering materials and footwear for explosive handling areas; tyres for aircraft and explosive-handling vehicles; furniture buffers and feet; mattresses and pads; and conveyor belts for mining.

For anti-static purposes the discharge path through a product should normally have an electrical resistance of less than 10^8 ohms at any time throughout its useful life. A value of 5×10^4 ohms for anti-static products is suggested as the lowest limit of resistance to give adequate protection against fire and dangerous electric shock in the event of any apparatus becoming defective when operating at voltages up to 250 V.

Copies may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 5s each.

Letter to the Editor

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Too Low? .

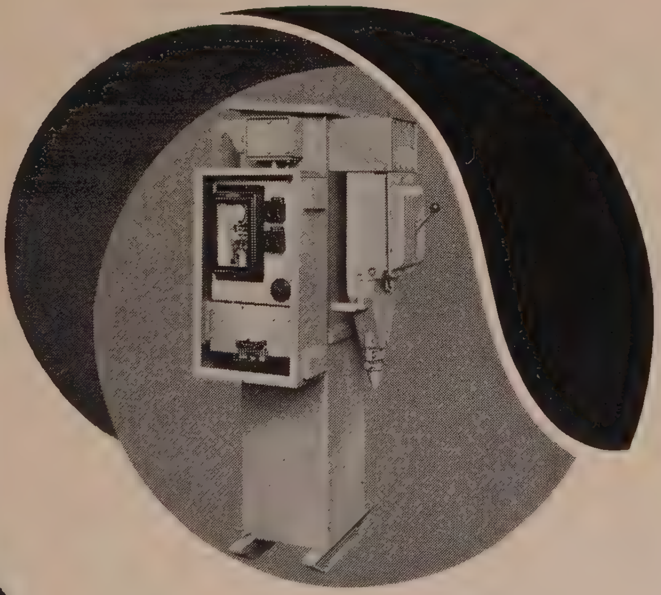
WHAT a poor salary is offered for the vacancy of district manager, Bristol. The figure of £3,040 to £3,270 is equivalent to about £850 to £1,000 before the war when I imagine the job would have been black-listed!

With the heavy responsibilities and size of the area at least £4,000 to £5,000 would be appropriate.

ENGINEER (RETIRED).

Brentford for B.R. Signalling

British Railways High Voltage A.C.
electrification schemes
involve new electric signalling.
To ensure absolute safety
and continuity the signalling supply—
at 650 volts—is available from
two separate sources:
from the normal three phase
415 volt mains or from
the 25 Kv traction lines stepped down
by a 25 Kv/650 volt transformer.
To give both supplies similar
characteristics, the voltage of the
traction supply—which may
fluctuate sharply with varying traction
load—is automatically stabilised
by Brentford Voltage Controllers,
which hold the output voltage of the
transformers +/— of 6% 650 volts.
These regulators will be situated in
the feeder stations
and track sectioning cabins.



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M 59

VIEWS on the NEWS

By "REFLECTOR"

WIDE prospects seem to be opening out for the managerial staffs of the electricity supply industry. As is known, the salaries of the senior employees are limited by the amount paid to the chairmen and deputy chairmen of the Boards. The *A.M.E.E. News* recalls that the salary "ceiling" was raised when the remuneration of chairmen of national boards was increased from £8,500 to £10,000. Now one of the nationalised undertakings—the railways—has a chairman who is being paid £24,000 a year and so the *A.M.E.E. News* says that "when the leaven has had time to work managerial grades may hope to benefit from a new raising of the salaries ceiling." But this is not all: it is remarked that "Dr. Beeching's remuneration while in the top grade for private enterprise undertakings is not exceptional. The industrial ceiling may be well above the £100,000 mark." And so we may yet see £80,000 a year sub-area managers.

* * *

Swans, with their wide wingspread, often cause overhead line trouble. The Eastern Electricity Board was recently asked by the Essex County Council for particulars of such trouble and the Board supplied the number of instances. The result, according to the *Hertfordshire Mercury*, was a somewhat wordy report from a committee of the County Council which said, *inter alia*:—

> "These figures do not appear to show that the problem is such as to justify initiating action to remove protection from the mute swan, and furthermore we understand that following representations which were made both by the Norfolk and East Suffolk County Councils, the Secretary of State has decided, after consultation with the Advisory Committee on the Protection of Birds in England and Wales, that there is not sufficient evidence at the present time to justify taking this action so far as those counties are concerned."

And so the birds will be left to exterminate themselves.

* * *

Three or four weeks ago I mentioned an Irish education committee which had decided not to install any more electrical appliances in its schools until it received a guarantee from the Electricity Supply Board that there would be no further increase in electricity charges. Other disgruntled consumers have announced their intention to abandon the use of electricity. One at least wishes he hadn't. He writes to the Dublin *Evening Mail* to say that having sold his electric cooker and replaced it by a gas cooker a gas strike is threatened. He asserts that if it takes place he will get rid of his gas cooker and "the gas meter will go along with it." Then he will look for a method of cooking that will not leave him and his family at the mercy of those who first create great hardship "and then clap on increased charges to keep their profits intact." It's a hard world, particularly in that distressful country. (The gas strike actually occurred this week.)

* * *

I have my own views about the extent to which the electricity consumer should provide the capital as well as the revenue of the Electricity Boards. The Treasury's insistence that about half of the Boards' capital expenditure should be met from their income seems to me to be barely justifiable. Anything above this might be regarded as excessive and yet, if he has been truly reported by the *Birmingham Post,* Mr. W. S. Lewis, the chairman of the Midlands Electricity Board, said at a recent gathering that "the M.E.B. hoped next year to finance 70 per cent of its capital expenditure from income." I suppose that it can be argued that consumers will ultimately benefit from the resultant reduction in capital charges—but will they ?

* * *

Electricity, published by the Electricity Council, reminds its readers that 1961 will be a historic year for the electricity supply industry. The first two full-scale civil nuclear power stations, Berkeley and Bradwell, are to begin supplying power to the grid; the impressive pumped storage scheme at Blaenau Ffestiniog should be commissioned in the autumn; and the cross-Channel power cable will be inaugurated. These schemes should attract the attention of overseas engineers and power authorities and bring much-needed kudos to this country—as well, I hope, as orders for equipment.

* * *

Half a century ago the *Electrical Review* (21st April, 1911) announced considerable reductions in the price of metal filament lamps. These, it was said, were made possible by the rapid advances in the sales of the lamps since they were introduced three years earlier. The General Electric Co. was offering a range of 100, 200, 400 and 600 W lamps, "consuming about 1 watt per candle" at prices from 4s 9d to 20s each. Long life was claimed for these lamps; in Hammersmith, London, the borough council officially recorded an average life of 3,600 hours for the lamps used for street lighting. Tests made by the National Physical Laboratory were said to have shown an average life of at least 2,000 hours for 100 V, 16 c.p. lamps. But they must have been pretty dim against the output of modern lamps.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

We reported last week that **Sir Toby Low,** P.C., K.C.M.G., C.B.E., D.S.O., had been appointed vice-chairman of the General Electric Co., Ltd. Sir Toby Low is M.P. for Blackpool North and has held office as Parliamentary Secretary, Ministry of Supply (1951-54) and Minister of State, Board of Trade (1954-57). He is a director of Dorman, Long & Co., Ltd., and other companies. It is also announced that **Lord Coleraine, Mr. M. Sobell** and **Mr. A. Weinstock** have been appointed to the board of the General Electric Co., Ltd. Messrs. Sobell and Weinstock are chairman and managing director, respectively, of Radio & Allied (Holdings), Ltd., for which the G.E.C. has made an offer.

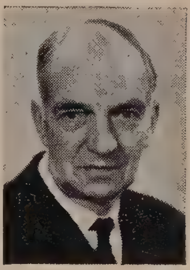
Mr. M. Nicholls, F.C.S., senior assistant divisional secretary, Southern Division, C.E.G.B., has been appointed assistant secretary (personnel) in the Regional Secretary's Department of the Southern, South Western and South Wales Region.

The Delta Group announces that **Mr. A. F. Thomas,** F.C.A., and **Mr. D. J. W. Dolton,** F.C.C.S., have been appointed to the boards of Sperryn & Co., Ltd., Birmingham, and C. H. Edwards, Ltd., Bilston.

Dr. W. S. Stiles, O.B.E., F.R.S., the president, took the chair at the annual dinner of the **Illuminating Engineering Society** at the Criterion Restaurant, London, on 12th April and responded to the toast of the Society proposed by Sir Robertson King, chairman of the Electricity Council. Mr. H. G. Campbell, immediate past-president, proposed the health of the guests and the reply was made by Mr. F. M. Lea, director of the Building Research Station, D.S.I.R. After the dinner there was a dance and a cabaret show.

Mr. H. Hurworth, M.I.E.E., sub-area engineer, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, is retiring on 31st May after over 45 years' service in the industry. Mr. Hurworth started with the Leeds Corporation Electricity Department in 1915 and has been sub-area engineer since vesting day. He will be succeeded by **Mr. D. Fawcett,** B.Sc. (Eng.), M.I.E.E., who since June last year has been senior assistant engineer, construction.

Mr. A. C. Lane, B.Sc. (Eng.), A.M.I.E.E., section leader and design engineer, a.c. commutator motors, Medium Electrical Machine Engineering Department, A.E.I. Heavy Plant Division, retired on 14th April after 38 years' service. Mr. Lane has been concerned, over many years, with the design, manufacture and application of variable speed a.c. commutator motors in most industries, including paper making and printing.

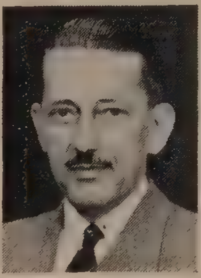


Mr. A. C. Lane

Mr. C. E. Payne, a director of the Ferguson Radio Corporation, Ltd., has been appointed to the board of Nash & Thompson, Ltd. The following sales appointments in connection with "Nashton" products have also been made:—**Mr. D. D. Williams,** home sales manager; **Mr. H. K. O. Mehner,** export sales manager; **Mr. E. C. Jennett,** sales engineer for the Midlands; and **Mr. P. Bettridge,** sales engineer for "Nashton" closed circuit television equipment.

At the I.E.S. dinner: Sir Robertson and Lady King, Dr. and Mrs. W. S. Stiles, Dr. and Mrs. F. M. Lea, and Mr. and Mrs. H. G. Campbell

The Solartron Electronic Group, Ltd., has appointed **Mr. Edwin Dunne,** A.M.I.E.E., as chief inspector, Farnborough plant. Mr. Dunne, who joined Solartron at the beginning of the year, had previously held appointments with De Havilland Propellers, Ltd., A. C. Cossor, Ltd., Cossor Radar & Electronics, Ltd., and E. K. Cole, Ltd.



Mr. E. Dunne

The Transmission Project Group of the Central Electricity Generating Board announces the appointment of three project engineers. They are **Mr. D. R. Lomer,** A.M.I.E.E., **Mr. H. A. C. Ridsdale,** B.Sc., A.M.I.E.E., and **Mr. T. F. V. Mason,** T.D., M.B.E., A.M.I.E.E., who are responsible for primary transmission projects in the following areas respectively:—*North* (North West, Merseyside and North Wales Region and North Eastern and Yorkshire Region); *Midlands* (Midlands and East Midlands Region and the Thames North area of the Eastern, London and South Eastern Region); and *South* (Southern, South Western and South Wales Region and the Thames South area of the Eastern, London and South Eastern Region).

Mr. Lomer served his apprenticeship with the B.T.H. Co. and was later with Messrs. Kennedy & Donkin. He joined the British Electricity Authority's Transmission Construction Branch in 1950 and in 1952 was appointed senior assistant engineer. Both Mr. Ridsdale and Mr. Mason joined the Transmission Construction Branch as senior assistant engineers in 1948. Mr. Ridsdale received his technical education at Bristol University and was later with the North-Eastern Electric Supply Co., Ltd., and the

British Insulated Callender's Construction Co., Ltd. Mr. Mason gained his technical education at Faraday House and was a student apprentice with the B.T.H. Co., subsequently joining the North Metropolitan Electric Supply Co. During the war he served with the R.E.M.E., attaining the rank of lieutenant-colonel.

Mr. J. S. Baillie, publicity manager of Bruce Peebles & Co., Ltd., retired on 7th April. Mr. Baillie joined the company 50 years ago as an apprentice and after initial training served in the Rotating Plant Test Department. In 1924 he joined the Contracts Department with special responsibility for publicity matters, and he was appointed publicity manager when the Publicity Department was established in 1936. At an informal ceremony last week Mr. W. B. Laing, managing director, presented a gold wristlet watch to Mr. Baillie and a pearl necklace to Mrs. Baillie. Gifts were also received by Mr. Baillie from his friends and colleagues in the company.

Mr. J. S. Baillie

Mr. J. H. Batchelor, accountant of the Southern Electricity Board's Newbury Sub-Area since vesting date, retired on 31st March after 50 years in the electricity supply industry. His pre-vesting service was spent with the Edmundsons group. He is succeeded by **Mr. Allan Barker,** D.F.C., B.Com., A.C.W.A., who joined the Southern Board's headquarters staff as assistant accountant in 1957; he was previously assistant sub-area accountant with the Yorkshire Electricity Board at Leeds.

Mr. W. A. E. Painting, M.I.E.E., who joined the Hackbridge Cable Co., Ltd., in May, 1960, as chief cable engineer, has been appointed technical director of the company. Mr. Painting has been in the cable industry for 30 years. He received his training with W. T. Henley's Telegraph Works Co., Ltd., and later held appointments with the National Insulated Cable Co. of India, Calcutta, as assistant works manager, the Concordia Electric Wire & Cable Co. as works and technical manager, and the St. Helens Cable & Rubber Co., Ltd., as manager of the Cable Division.

Mr. W. A. E. Painting

Mr. R. H. Hodgson

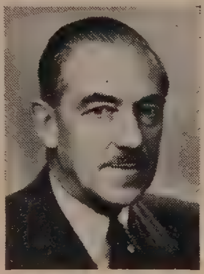
Mr. R. H. Hodgson, works manager, has been appointed production director. He joined the company in 1919 and has been directly concerned with all sections of cable production.

Mr. J. F. Ransom, who has been with the Hackbridge Cable Co. for nearly 40 years, has been appointed sales manager.

Mr. A. Keith McCrone and **Mr. G. E. Cobb** have been appointed assistant directors of Blackstone & Co., Ltd.

Mr. J. C. McVeigh, M.A., M.Sc., A.M.I.Mech.E., has been appointed as principal lecturer in the Department of Mechanical Engineering at the Borough Polytechnic, London.

Mr. W. Percy McGeoch, deputy chairman and joint managing director of William McGeoch & Co., Ltd., has been appointed president of the National Brassfoundry Association, of which his father was president in 1930. Mr. McGeoch has served on the Council of the Association for many years, and has been chairman of the Midlands Branch, honorary treasurer and senior vice-president.



Mr. W. P. McGeoch

Mr. K. H. J. Adams, B.Sc., A.M.I.E.E., A.Inst.P., has been appointed production manager of the Semiconductor Division of the Brush Crystal Co., Ltd. Mr. Adams was formerly senior production engineer at Semiconductors, Ltd. After graduating with honours in physics at London University in 1951, he joined the Mullard Radio Valve Co., Ltd., as a development engineer working on problems associated with repeater valves. In 1953 he went to the Shell Refining Co., Ltd., but returned to the Mullard company in 1954 to head the department handling its guided missile valve project. He joined Semiconductors, Ltd., in 1959.

The Solartron Electronic Group, Ltd., have appointed **Mr. T. Morrison** as group field sales manager for the United Kingdom.

As reported in last week's issue (p. 665) Mr. E. A. V. Peckham has succeeded Col. B. H. Leeson as president of the Electrical Industries Club. The accompanying picture shows Col. Leeson (left) congratulating the new president on his election

Mr. D. A. Hamblin has been appointed manager of the Merseyside and North Wales Electricity Board's Aberystwyth District where he has been district engineer since 1949, and **Mr. A. A. W. Hawley,** senior assistant technical engineer with the South of Scotland Electricity Board, has been appointed manager of the "Manweb" Conway Valley District. Mr. Hamblin takes up his new appointment at once and Mr. Hawley in July.

Mr. A. Willis has been appointed electrical manager of F. K. Smith, Ltd., electrical and radio wholesalers, Liverpool. He was previously with A.E.I. Cable Division.

Mr. H. E. Cox

Mr. H. E. Cox, M.I.E.E., has been appointed director of manufacture, Associated Electrical Industries (Rugby), Ltd., following the recent retirement of **Mr. H. L. Satchell,** M.B.E., F.I.W.M. Mr. Cox received his early technical training at Finsbury Technical College and joined the Rugby Works of the British Thomson-Houston Co., Ltd. (now A.E.I. (Rugby), Ltd.) in 1919. He later transferred to the Switchgear Engineering Department, Willesden, where he specialised on design of oil circuit-breakers and bushings, becoming chief designer in 1927. Mr. Cox was appointed superintendent of the Engineering Department and Drawing Office in 1936 and in 1946 he also took over the management of the Willesden Switchgear Works. He was appointed manager of the Rugby Works in 1955 and general manager in 1957. He has been a director of the company since 1958 and was appointed deputy director of manufacture in January last year.

Mr. J. O. M. Palmer, A.M.I.E.E., has been appointed technical director and **Mr. H. R. Lowday** production director of the Bryce Electric Construction Co., Ltd.

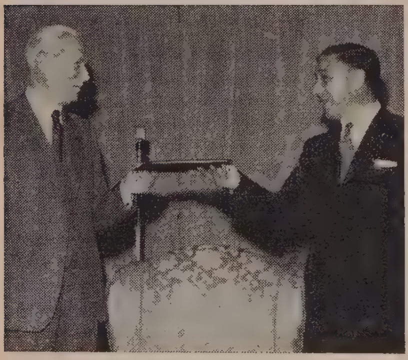
Mr. Palmer joined the company in 1958 as chief designer and was appointed chief engineer in January last year. He received his training with the British Thomson-Houston Co., Ltd., and Asea Electric, Ltd., and after four years in the R.N.V.R. held senior positions with Asea Electric, the English Electric Co., Ltd., Canada, and Gresham Transformers, Ltd.

Mr. J. O. M. Palmer

Mr. H. R. Lowday

Mr. Lowday received his training with Johnson & Phillips, Ltd. After six years with the British Electric Transformer Co., Ltd., he joined Bryce Electric Construction Co., Ltd., in 1937 as chief of test and was appointed works manager in 1949.

Mr. J. Bell, formerly deputy director and manager of the Research Laboratories of the General Electric Co., Ltd., has been appointed managing director of the M-O. Valve Co., Ltd., following the retirement of **Mr. G. A. Marriott.** Mr. Bell joined the G.E.C. Research Laboratories in 1929 and became responsible for valve research and before and during the war he was engaged in developing valves for radar. After the war Mr. Bell took over all valve research programmes at Wembley and in 1951 he was appointed deputy to the director of the Laboratories. He joined the M-O. Valve board in April last year.



Mr. G. A. Marriott (left), retiring managing director of the M-O. Valve Co., Ltd., being presented with an armchair and a book by his successor, Mr. J. Bell

Mr. Marriott has served with the G.E.C. for 42 years. On the formation of the Valve Department in 1924 he was made assistant manager, and later manager, and in 1958 he was appointed managing director of the M-O. Valve Co. and a director of Watson & Son (Electro-Medical), Ltd. He was chairman of the British Radio Valve Manufacturers' Association in 1940-42 and 1947-49 and vice-chairman 1949-61.

The Minister of Power has appointed **Mr. E. Hyman,** J.P., of Southampton, as chairman of the Southern Electricity Consultative Council from 1st May, in succession to **Group Captain J. C. M. Hay,** O.B.E., D.L., who is retiring on 30th April after eight years in office. Mr. Hyman has been a member of the Council since its formation in 1949 and deputy chairman since 1956.

Mr. H. G. Hinckley has been appointed manager of the Machine Tool Control Department of Ferranti, Ltd., Edinburgh. He replaces **Mr. D. T. N. Williamson,** who has left to become director of research and development of the Molins Machine Co., Ltd., London. Mr. Hinckley, who is widely known in aviation circles, served with the T.R.E. and British European Airways before joining Ferranti, Ltd., in 1948 to establish and operate the trials and flying units in Edinburgh.

Mr. H. G. Hinckley

Mr. Alan W. Baker has been appointed general manager of Chloride Batteries, Ltd., in place of **Mr. C. Pritchett** in order to release him for other duties in technical management within the Chloride group. Mr. Baker joined Chloride as assistant general manager in 1959. He was born in New Zealand and educated at Eastbourne College and Peterhouse, Cambridge, where he graduated with honours in the Mechanical Sciences Tripos, and subsequently spent three years with the Metropolitan-Vickers Electrical Co., Ltd. After a similar period with Manchester Corporation Transport Department, he joined the staff of Urwick, Orr & Partners, Ltd., management consultants, in 1940. Returning to that company after the war, he assisted in building up their overseas consulting practice and finally assumed control of all their overseas activities.

Mr. Alan Plumpton, B.Sc., A.M.I.E.E., has been appointed manager of the South Wales Electricity Board's East Monmouth District as from 1st May in succession to **Mr. G. J. Hughes,** B.Sc. (Econ.), A.M.I.E.E., who took up an appointment as assistant chief commercial officer of the North Eastern Electricity Board in March. Mr. Plumpton has been commercial engineer of the Stockton District of the North Eastern Board for the past four years. Under interchange arrangements, he spent ten weeks in America last year with the Detroit Edison Co.

Mr. A. Plumpton

Mr. S. W. Hutton, who has been managing the Export Division of the Claremont Electrical Distributing Co., Ltd., for the past year and who was previously a director of Progress Cables, Ltd., has now become sales manager and director of Cedco (Overseas), Ltd., a new company which began operating at 71a, Cricklewood Broadway, N.W.2, on 1st April.

Mr. Paul Gotley has been appointed to the board of directors of the Electrical Remote Control Co., Ltd. He has been with the company for three years and was previously works manager.

Mr. P. Gotley

Mr. S. H. Hough has been elected vice-chairman of the Pitch Fibre Pipe Association of Great Britain in succession to **Mr. D. Kirkness,** who has relinquished office after serving for four years.

OBITUARY

Mr. J. E. Calverley.—The death occurred on 10th April of Mr. J. E. Calverley, M.I.E.E., M.I.Loco.E., who until his retirement in 1955 was deputy chief engineer (technical) of the English Electric Co., Ltd. Mr. Calverley joined the Phœnix Dynamo Co. in 1908 as an assistant draughtsman and two years later went to Dick, Kerr & Co. as assistant design engineer. He did much pioneering work in the field of d.c. machine design, and his interest in high voltage d.c. transmission dated back to the early 1920s when he was co-inventor (with the late W. E. Highfield) of the "transvertor." He was a member of many associations including the E.R.A. and the C.I.G.R.E. where he was chairman of the group on high voltage d.c. transmission for many years. Mr. Calverley is survived by his widow, and three sons who all hold appointments at the English Electric Co., Ltd.

Mr. D. C. Redfern.—The death occurred on 27th March, at Crawley, Sussex, of Mr. Dominique Charles Redfern; he was seventy-seven. Mr. Redfern was born in Manchester and was educated at Southport Grammar School. He started his fifty years in the electricity supply industry with the Southport Corporation and was later with the Tynemouth and Stoke-on-Trent Corporations, the Lancashire Electric Power Co. and the Yorkshire Electric Power Co. He joined the Lothians Electric Power Co. in 1922 and became chief assistant engineer. From 1948 until his retirement in 1950 he was sub-area engineer of the Lothians Sub-Area of the South East Scotland Electricity Board.

Mr. Harold Mackay, A.M.I.E.E., who died recently at the age of 77, had been connected with Whipp & Bourne, Ltd., since the firm's inception in 1903 and was a director from 1920 until his death. His early training in electrical engineering was obtained with Bertram Thomas (Engineers), Ltd. He joined Whipp & Bourne, Ltd., as a draughtsman and was made manager of the Castleton works in 1934, retiring from executive duties with the company in 1952.

INDUSTRIAL CONTROL SYSTEMS

"Control for Industry" is the title of a handsomely produced brochure received from Lancashire Dynamo Electronic Products, Ltd., Rugeley, Staffs. In 42 pages it illustrates (largely in colour) and briefly describes equipment produced by the company for the control of many types of industrial drives, processes and operations: newspaper colour printing, tyre testing, large machine tools, grinders and pulverisers, welding, counting and measuring, temperature and level control, multi-motor drives, to mention a few examples. A great deal of general information is included and a special feature is a three-fold diagram showing the complete layout of a continuous impregnating and calendering line for tyre fabric, showing the variety and amount of control equipment involved.

PARLIAMENTARY REPORT

"Do-It-Yourself" Dangers

The week-end opportunist handyman tinkering with electricity was often a "menace," Lord Auckland told the House of Lords last week. He was initiating a debate on the heavy loss of life through accidents in the home and he and other speakers referred to the electrical dangers. Lord Auckland spoke of the old Victorian mansions often inhabited by elderly people where some of the electrical wiring defied comment—there were loose wires everywhere and the plugs were often completely unsafe.

Lord Crook said that lighting and power points were obvious things to which any Government looking at housing design should pay regard. Many people in old houses would like to install modern wiring—say, a 13 A ring circuit—but felt they could not afford it. The Government might extend improvement grants or loans for that purpose.

Lord Stonham said that the interim of the Molony Committee had drawn attention to the dangers arising from imported electrical appliances in which the coloured wires did not mean the same thing as here. Such imports should be prohibited. There was a strong case for additional grants to the British Standards Institution for all the additional testing work involved, particularly with new products, and the setting up of standards. The "do-it-yourself" variety of electric blanket was a particular danger and it was essential that a British Standard should be established and regulations governing safety should be introduced.

Lord Citrine said that in the electricity industry a great deal of thought and ingenuity had been given to making apparatus safe. But all apparatus could not be made foolproof. Even people in responsible positions made mistakes. The greatest problem was to make the handling of electricity safe for the handyman. How were people to be stopped from doing what seemed to them simple electrical jobs?

Earl Bathurst, for the Government, said: "I would leave all electrical fitting to the man who knows how to do it and I can give no better advice than that given by Lord Auckland: Don't fiddle about with your electrical equipment."

Concern at Falling Exports

Mr. R. Mason wanted to know why the value of United Kingdom exports of telegraph and telephone equipment and long distance communication line apparatus had fallen from £21,889,672 in 1959 to £19,449,849 in 1960 and also why the value had fallen from £3,943,672 in the first two months of 1960 to £3,255,567 in the similar period of 1961.

The Postmaster General, Mr. R. Bevins (in a written answer) said it was true that the exports, which had been running at a very high level for several years, were now tending to decline. The manufacturers were greatly concerned at this trend and were doing their utmost to improve their export performance in the face of increasingly severe international competition. They were also having to face growing competition from local manufacture in many Commonwealth countries.

Mr. Mason also asked if the Postmaster General would consider establishing a Telecommunications Export Board. Mr. Bevins said the industry was well aware of the need to increase exports of telecommunications equipment. About 40 per cent of the total output of the industry was exported in 1960. The President of the Board of Trade and he were always very happy to discuss with them ways and means of maintaining and increasing the level of exports. In his view and that of Mr. Maudling it was doubtful whether the setting up of such a Board would improve the position.

Contract Profit Margins

The Postmaster General told Mr. Mason in a written answer last week that generally speaking the Post Office followed the standard Government practice on costed contracts of aiming to allow a return on capital employed of about 7½ per cent subject to some addition if justified by the circumstances.

No Lamp Monopoly

Dr. B. Stross asked the President of the Board of Trade whether he was aware that tenders received by Stoke-on-Trent Council for cement, macadam and electric lamps were often identical in price and whether in view of further evidence of monopoly practice he would refer the matters to the Monopolies Commission.

The Parliamentary Secretary to the Board of Trade, Mr. N. Macpherson, said that information showed that tenders recently received by the Council were identical in some cases but not in all. As regards electric lamps the President of the Board of Trade did not consider that the information provided showed that there was either an agreement or a monopoly.

INDUSTRIAL NEWS

Industry and the Budget

INTRODUCING his Budget on Monday, Mr. Selwyn Lloyd said that his purpose must be to counter inflation, while at the same time increasing the rewards for initiative and enterprise. He had decided to raise an extra £80 million in taxation.

Industry is affected by three main proposals, two of which the Chancellor described as "economic regulators."

Profits Tax is to be increased by 2½ per cent to 15 per cent from 1st April. This will yield about £1·5 million this year, £45 million in 1962-63 and £70 million in a full year.

Payroll Tax. Power is to be taken to impose at any time a surcharge up to a maximum of 4s per week per employee. At its maximum the yield is estimated at £200 million in a full year.

Purchase Tax and other Duties. The Chancellor will also take powers enabling him at any time to raise or reduce purchase tax and all the main Customs and Excise revenue duties (excepting the TV licence duty and vehicle excise duty) by a maximum change in either direction of up to 10 per cent of existing charges. This means consumer purchasing power can be curbed or stimulated by up to £200 million in each direction or by £400 million overall.

Other proposals in the Budget are the abolition of surtax on earned incomes up to about £5,000 from now on and payable in 1963; the limiting of the capital allowance on motor cars for business purposes to £2,000 for each car; a fixed duty for Bills of Exchange of 2d instead of *ad valorem*; an increase in motor vehicle licences; a duty of 10 per cent on TV advertisements; and a duty of 2d per gallon on heavy oils.

In his speech, Mr. Lloyd appealed for a curtailment of business entertainment, and said that legislation on this might be introduced next year. More information on expenses will be required by the Inland Revenue. He rejected the idea of a sales tax.

He hinted that protective tariffs would be reduced. Some industries, he said, are insufficiently accustomed to competition, and insufficiently aware of the need for technical improvement. "The reduction in tariffs which we are working for may have a beneficial effect in this respect."

Commenting on the proposals to adjust purchase tax rates, Mr. S. F. Steward, director of B.E.A.M.A., said he hoped full regard would be paid to the importance of maintaining stability in the growth industries, such as washing machines and refrigerators, in which export potential depended on a stable home market. A reduction in the hire-purchase deposit was needed to secure the full revival that the domestic electrical appliance industry needed.

The payroll tax would "give a considerable incentive to industry to modernise production by the installation of labour-saving and automatic electrical equipment."

Power Station Efficiencies

A SAVING of nearly £3,000,000 in fuel costs was made by the Central Electricity Generating Board during 1960 due to improved efficiency of the generating plant. The overall average thermal efficiency of the power stations operated by the Board was 26·71 per cent during the twelve months, compared with 26·36 per cent for the previous year. Almost one-third of the 102,891 million kWh supplied from all stations was provided by the twenty most efficient stations. These stations had an average efficiency of 31·49 per cent, their individual percentages being:—

Station	Thermal Efficiency %
Blyth "A," Northumberland	34·28
Agecroft "C," near Manchester	34·14
High Marnham, near Tuxford	33·20
Drakelow "B," near Burton-on-Trent	33·03
Castle Donington, Leicestershire	32·70
Ferrybridge "B," near Castleton	32·60
Staythorpe "B," near Newark	32·35
Willington "A," near Derby	31·79
Northfleet, near Gravesend	31·30
Tilbury "A," near Grays, Essex	30·90
Belvedere L.P., Kent	30·77
Marchwood, near Southampton	30·75
Drakelow "A," near Burton-on-Trent	30·71
Aberthaw, near Barry	30·63
Rogerstone, near Newport, Mon	30·37
South Denes, near Great Yarmouth	30·25
Meaford "B," near Stone	30·15
Stella South, near Blaydon, Co. Durham	30·14
Wakefield, Yorks	30·14
Stourport "B," H.P., Worcs	30·04

R.E.C.M.F. REPORT

IN the course of its report for 1960 the Council of the Radio and Electronic Component Manufacturers' Federation, presented at last week's annual meeting, shows that the value of production of the radio and electronic industry was estimated at about £400 million, against £365 million in 1959. The addition of the electronic output of associated industries probably amounted to a further £100 million. It is estimated that 2,400,000 radio sets were produced (as compared with 1,850,000 in 1959) while the number of television sets made fell from 2,840,000 to 2,000,000. Nevertheless the component output continued to expand and the same was true of "professional" equipment production.

Radio and electronic exports in 1960 were valued at £59·1 million (£55·4 million in 1959) and the principal markets, headed by the United States, remained relatively unchanged. Imports of radio and electronic equipment during 1960 were valued at £22·6 million, against £20·6 million in 1959.

It is expected that the output of components will continue to follow its regular upward course at a rate of 10 to 15 per cent per annum.

Work Starts at Sizewell

Preparatory work has begun at the site of the 580 MW nuclear power station which is to be built for the Central Electricity Generating Board at Sizewell, Suffolk, by the English Electric, Babcock & Wilcox, Taylor Woodrow Atomic Power Group. The labour force will rise to a peak of about 2,400 next year.

H.R.H. the Duke of Edinburgh last week became the first Honorary Fellow of the Illuminating Engineering Society. In the photograph Dr. W. S. Stiles (president, I.E.S.) is seen presenting the certificate of honorary fellowship to the Duke

E.T.U. GENERAL SECRETARY'S ELECTION "INVALID"

THE hearing began in the High Court on Monday of the action brought by two members of the Electrical Trades Union, Mr. John Byrne and Mr. Frank Chapple, against Mr. Frank Foulkes (general president), Mr. Frank Haxell (general secretary), 14 other members of the Executive Council and officials of the Union, and the Union. Plaintiffs claimed, *inter alia*, a declaration that the election of Mr. Haxell as general secretary in December, 1959, was contrary to the rules, *ultra vires*, illegal and void and that Mr. Byrne was validly elected general secretary; alternatively, that the Union was bound forthwith to hold an election; and damages for conspiracy.

Mr. Neil Lawson, Q.C., for the defendants, said it had emerged that in the election branch secretaries had, by mistake, issued ballot papers to members not entitled to vote and withheld them from others entitled to vote. It had also been found that there were irregularities in the scrutiny of votes. In the circumstances the defendants did not now seek to uphold the validity of the election and agreed that a new election must be held. Since, because of the passage of time, it was doubtful whether the Council could declare the election void, it might be as well that the Court should make a declaration. Defendants denied and contested to the utmost the allegations of conspiracy and fraudulent practices made against them.

Mr. Justice Winn said that the affairs of the Union had national significance and it was important to declare someone validly in possession of the office of secretary. If it were now accepted that Mr. Haxell was not validly elected, to avoid further complications it ought to be made clear, in the form of some personal assurance, that he would not purport to exercise the functions of secretary.

Mr. Gerald Gardiner, Q.C., for plaintiffs, said he would like to consider the position because one alternative would be that Mr. Byrne was validly elected; another would be a fresh election, and before that took place it was essential that members should know, by the hearing in Court, whether the charges were well founded or not.

Opening the case, Mr. Gardiner said that plaintiffs alleged that defendants conspired together by breaches of the rules and by unlawful and fraudulent practices to prevent non-Communist members who were critics of the leaders from being elected or appointed officers and to procure the election of Communist members, or of candidates favoured by them. Ways in which it was alleged that this was achieved included using the rules, which were of unimaginable complexity, to disqualify branches where the majority were in favour of a non-Communist candidate. In the 1959 election 109 branches were disqualified on every conceivable ground, but mostly on the ground that the returns were posted too late. The defendants had had to disclose envelopes the date stamps of which bore no relation to the dates when the branches said they were posted. The only reasonable conclusion was that the defendants sent a man in a car to post empty envelopes to themselves.

The hearing is expected to last for several weeks.

American Anti-Trust Suits

Reuter reports from Washington that the Justice Department has filed additional damage suits against manufacturers of electrical equipment already convicted of violating anti-trust laws. The six suits named 11 corporations as defendants, including the General Electric Co. and Westinghouse Electric Corporation. The Attorney-General, Mr. Robert Kennedy, said that the damages sought would run into "millions of dollars."

The companies named were indicted last December on charges of having "rigged" bids during the previous nine years on public and private contracts. Several of their high executives served jail terms as a result of that action. The suits now filed, in Philadelphia, are on behalf of the Tennessee Valley Authority and other federal agencies.

Last month the Justice Department and the T.V.A. jointly filed an action seeking recovery of more than $12 million (about £4,280,000) on purchases since 1951 of large circuit-breakers from the General Electric, Westinghouse and three other companies. The latest actions relate to purchases by the T.V.A. of power switchgear assemblies, transformers and turbine-generators, dating back fourteen years. Purchases for the Army, Navy, Air Force and Atomic Energy Commission are also involved.

Acquisition of Electric Vehicle Business

Negotiations have now been completed for Austin Crompton Parkinson Electric Vehicles, Ltd., to take over the entire electric vehicle business of T. H. Lewis, Ltd.

The take-over arrangements, expected to be complete by 1st June, will provide for the continued production of the "Electruk Rider" and the "Electruk" pedestrian-controlled vehicle in their present form, and the full availability of spare parts for both models. Both companies emphasise that every effort will be made to avoid inconvenience to those who have orders on hand for these vehicles.

Unusual Church Window

A service of dedication of the stained glass at Christ Church, Blackfriars Road, London, S.E.1, was conducted yesterday (Thursday) by the Bishop of Southwark and was attended by representatives from local industries. The church, recently re-built and opened for industrial mission use, is unusual in that its ten nave clerestory windows depict the different types of industry which are carried on in the parish. One, on the theme "Fuel and Power," shows the nearby Bankside power station and was provided with the aid of a donation from the Central Electricity Generating Board.

The window on the theme of "Fuel and Power" at Christ Church

FIVE WAYS TO INCREASE EXPORTS

AN increase of at least 10 per cent in exports must be the aim for 1961 said Sir William McFadzean in his presidential address to the Federation of British Industries last week.

This could be achieved by a combination of many things, but Sir William put forward a "few essentials":—

1. British manufacturers must be "extremely efficient producers of the right goods at the right price and at the right time." Too little attention was still being given to the tastes and requirements of overseas customers. We were still falling down on delivery and in not notifying customers quickly enough when, often through circumstances beyond our control, delivery was going to be delayed.

2. There were many factors outside the control of industry which vitally affected export performance—such as the cost of products and services from the nationalised industries; transport and dock facilities; the level of Government and public authority spending—and Sir William hoped there was a growing determination amongst all concerned that, where necessary, they would put their houses in order and render the most effective assistance to the cost of British exports.

3. We have not enough salesmen on the road. Salesmen, to be really effective overseas, should be able to speak languages; should know the feelings and appreciate the requirements and aspirations of the countries to whom they were selling, and should be given maximum status. "I sometimes wonder if the virtues and status of being a scientist, a technician, a production efficiency expert, etc., have all been over-boosted for many years relative to being a salesman. Too often in this, and possibly other countries, the belief is held that any 'dogsbody' can go on the commercial side. How wrong this is."

4. It was also very important that we all "sold" Britain too. A warm feeling for Britain was too often associated with our old traditions and too seldom allied to our modern achievements. How often, when we did put a story across, it was concerned only with our problems. Newspaper reports gave the impression that labour was constantly on strike whereas fewer man-hours per annum were lost in Britain through industrial disputes than in practically any other western nation.

5. We did not, in Sir William's opinion, compare unfavourably with other countries in credit insurance, but where there could be improvement was in the more flexible and speedy implementation of our regulations.

During his two years in office, Sir William said, he had not been able to achieve his hope of holding a Commonwealth Industries Conference in London. He passed on the idea as being "practicable and desirable" to his successor, Mr. Cyril Harrison, vice-chairman and managing director of the English Sewing Cotton Co., Ltd.

Contract Price Formulae

THE British Electrical and Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. The rate of pay for adult male labour effective since 26th December is deemed to be 213s 6d. The "costs of materials" figures are: For electrical machinery and equipment the Board of Trade index figures published on 14th April are 181·5 (1949=100) and 117·0 (1954=100); both figures are provisional. For turbo-generating and allied plant: Materials used in mechanical engineering industries 190·8 (1949=100) and 127·0 (1954=100); both figures are provisional. Blast furnaces and iron and steel melting and rolling (1948 S.I.C. Ref. 40/41) 189·3 (1949=100) (provisional) and other steel goods, excluding tubes (1958 S.I.C.), 129·0 (1954=100). The price of ¾in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 14th April) is 49⅝d/lb.

Better Export Credit Facilities

THREE important developments in the services offered by the Export Credits Guarantee Department were introduced last week.

(1) The premium rates for E.C.G.D. insurance are being reduced by varying amounts. The main benefit will be concentrated in those markets in which the highest rates are being charged.

(2) Under an entirely new system the E.C.G.D. will guarantee loans made for periods of longer than five years by financial institutions in the City of London to "creditworthy overseas purchasers." The exporter will get part-payment with contract, and another part on completion (that part being at his own risk should there be any dispute as to performance). But the bulk will be paid by the buyer out of the loan and this will be guaranteed 100 per cent by E.C.G.D. The new facility will "be applied with great selectivity" and will be limited by the balance of payments situation. In highly exceptional cases supplementary finance may be provided from the Exchequer under Section 3 of the Export Guarantees Act.

(3) Another innovation, this time to help firms at present exporting less than £10,000 a year or with no experience of exporting, is a simplified credit instalment scheme that will be available across the counter at all E.C.G.D. branches. It will provide 90 per cent cover against loss on all export business for a flat rate premium of 15s per cent.

In response to the Government's new scheme for guaranteeing export credits for periods of from seven to 12 years, Lazard Brothers & Co., the merchant banking house, has arranged with 28 insurance companies to provide a total of £11½ million for this purpose. This sum will go further than might appear for only about a third of the contract price has to be financed out of these insurance company funds.

Elstree-Mill Hill 275 kV Line

Underground cables are to be used for a large part of the 275 kV line between the existing substation at Elstree and a proposed substation at Mill Hill. The Minister of Power announced last week that in consultation with the Minister of Housing and Local Government he had accepted the recommendations of the inspectors following the public inquiry in July last. The C.E.G.B. had objected to the use of cables on the grounds of expense.

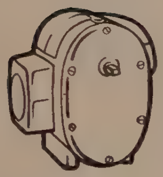
BRENTFORD TRANSFORMERS MERGER

Subject to shareholders' approval, three private companies, Brentford Transformers, Ltd., Langley Alloys, Ltd., and Hugh Smith (Glasgow), Ltd., are to be merged with the General Hydraulic Power Co., Ltd. The boards have agreed to effect the merger under G.H.P., which is to be renamed the G.H.P. Group, by the issue of shares in G.H.P. in exchange for the issued share capitals of the three companies. Mr. D. H. de Trafford, who is chairman of each of the three companies, became a director of G.H.P. in 1959.

270 STANDARD SPEEDS

from 57 mins. per rev. to 2,700 revs. per min.

No other motors offer the wide range of speeds, torques and programme switching of the versatile Drayton RQ. Conforming to BSS 170/1939, it is suitable for continuous or intermittent running; reversing; and can also be supplied with or without internal limit and programme switches. Motors giving a shaft rotation of more than one revolution before switching operates, or with multi-position switching, are also available. Write now for your copy of Data Sheet No. 302.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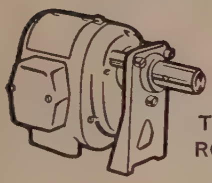
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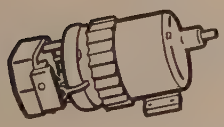
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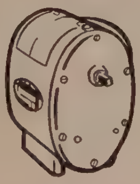
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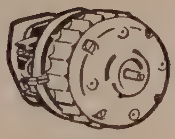
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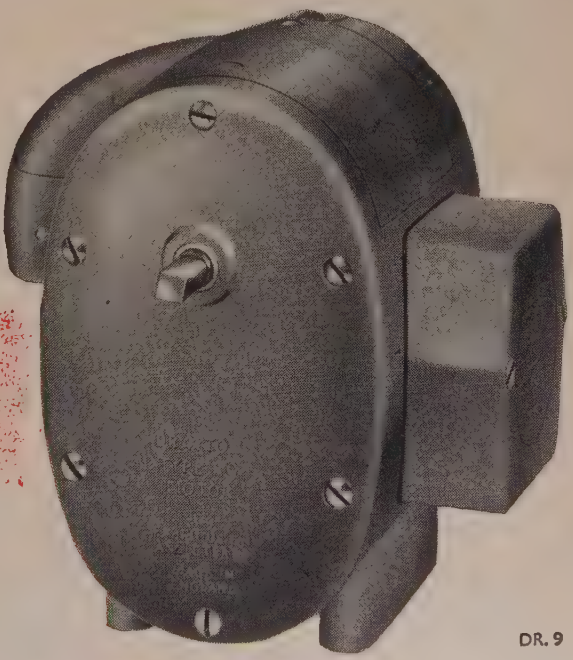

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International Market Acceptance

INTERNATIONAL MARKET ACCEPTANCE . . .

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Seneral view of an Asquith 18-station
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utomobile cylinder heads, both 4- and
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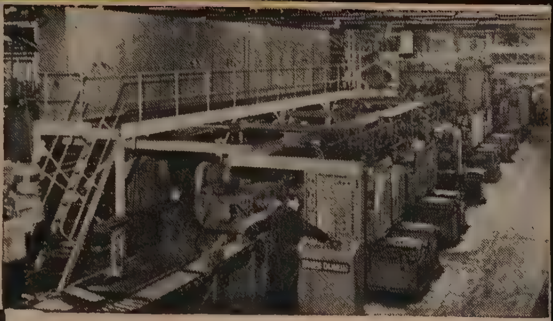
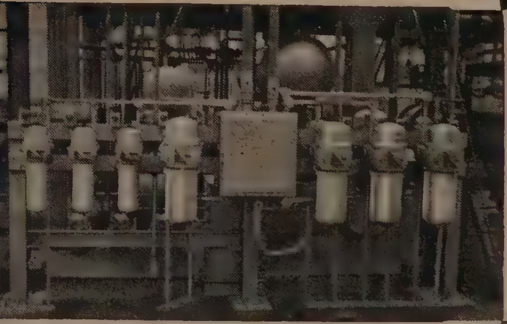
ame machine at Vauxhall Motors Ltd.





U.S.A.

A grouping of "Spin-Top" Flameproof Combination Starters at an American Oil Refinery.

BELGIUM

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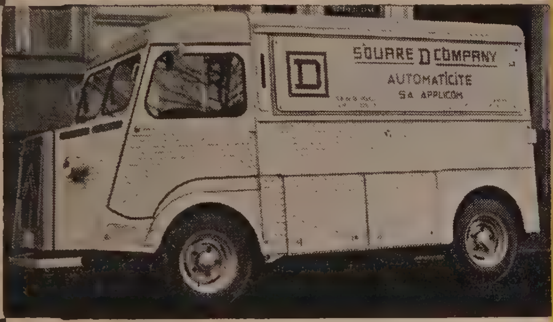

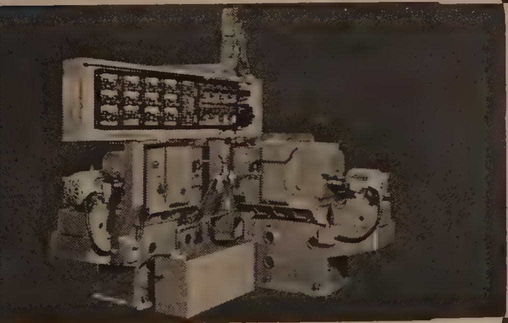

ITALY

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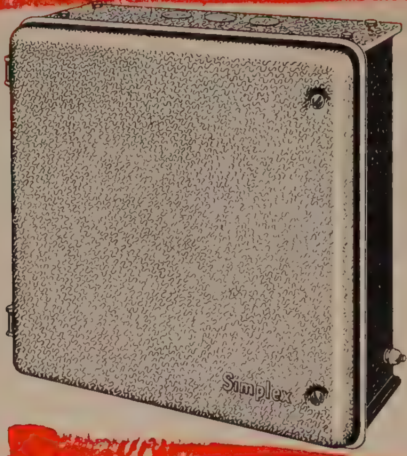
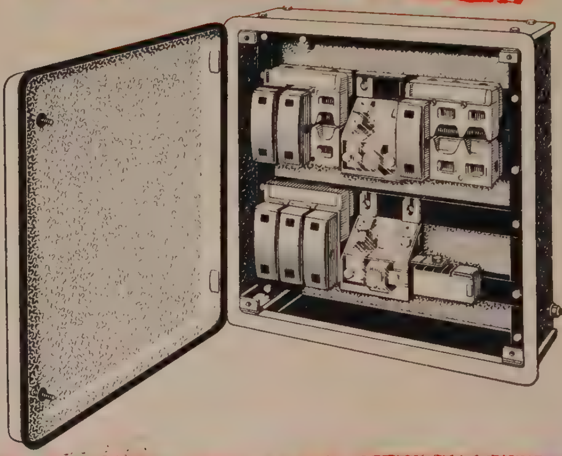
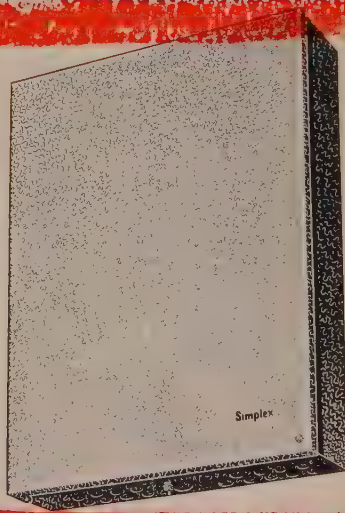


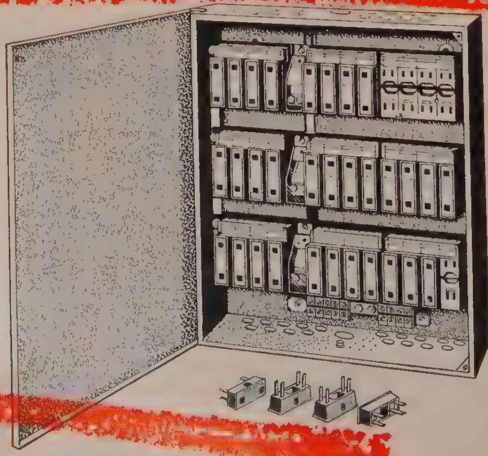
Star Distribution Fuseboard. Neat appearance. Strong All-Steel case.



Star Distribution Fuseboard with cover open; some fuses are removed to show dead-front feature.



Star Economy Distribution Fuseboard.



Star Economy Distribution Fuseboard with cover open showing shields, and dead-front feature when fuses are removed.

Dearer Electricity in the Midlands

INCREASES in tariffs were announced last week by the Midlands Electricity Board. The revised charges, which apply to most domestic, commercial and industrial consumers, take effect from the meter readings nearest to or after 30th April. Domestic consumers will pay 6d/kWh instead of 5¾d for the first block (7d instead of 6¾d for those with prepayment meters). The charge for the second block will be 2¼d/kWh instead of 1¾d; and additional supplies 1·1d instead of 1d. The number of kWh in both blocks remains at 14 per room per quarter up to ten rooms and seven for each additional room.

Small commercial and industrial consumers will pay 6d/kWh instead of 5¾d for the first block and 5d instead of 4½d for the second block, both blocks being calculated on floor area as at present; and 1·1d instead of 1d for additional consumption. Similar changes are made in the tariffs for farm premises and outside lighting.

Most large industrial consumers will pay 1s more per kVA of maximum demand each month in each step of the maximum demand tariff, the "unit" charge remaining as at present. The annual maximum demand tariffs (Nos. 6 and 7a) will be unchanged, and the tariff for restricted night-hour storage supplies (No. 8) also remains unchanged at 0·7d for high voltage supplies and 0·75d for low voltage supplies.

Announcing the new tariffs, the chairman of the board, Mr. W. S. Lewis, said "We regret the need for these increases, which I forecast some months ago when we were faced with increased costs over which we had no control amounting in a full year to over £3 million." Increased bulk supply charges, he said, were estimated to account for £1,220,000; increases in salaries and wages for £995,000; and an increase in the price of coal for a net figure of £953,000. Other costs, such as rates, had also continued to rise. In addition, they had to take into account national policy decisions that the industry should meet a larger proportion of its capital requirements out of revenue and reduce its borrowing. In the financial year 1962-63 the Midlands Board expected to meet something like 70 per cent of its capital expenditure out of revenue.

Large Transformers for C.E.G.B.

The Midlands Project Group of the Central Electricity Generating Board is to place an order with Associated Electrical Industries, Ltd., for two 400 MVA generator transformers for connection to the supergrid at the Drakelow "C" power station, near Burton-on-Trent. These generator transformers are the largest so far ordered by the C.E.G.B. and will connect two 375 MW super-critical turbo-generators to the grid system. A.E.I. is manufacturing one of these sets.

When fully assembled each transformer will weigh 270 tons and will be 38ft long by 13ft wide by 30ft high. Special arrangements with the Ministry of Transport for delivery to site will be necessary.

NUCLEAR ENGINEERING COMPANY

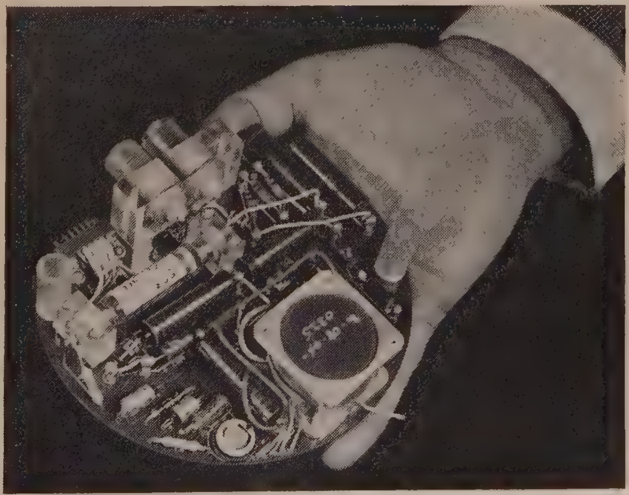
A company named Nuclear Developments has been formed jointly by the Metals Division of Imperial Chemical Industries, Ltd., Rolls-Royce, Ltd., and the Rio Tinto Co., to operate in the field of civil nuclear engineering in collaboration with the atomic energy consortia. Rolls-Royce and the I.C.I. Metals Division are already interested in nuclear power and materials development and the Rio Tinto Co. mines and processes uranium ores. Nuclear Developments will be in a position to deal with the production of nuclear fuel elements when civil companies are permitted to undertake this work.

Satellite E.H.V. Generator

AN e.h.v. generator to be used in the Anglo-American space research satellite, UK Scout 1, has been designed for the Space Research Group at University College, London, by Bristol Aircraft, Ltd. In upper atmosphere and space research, proportional gas counter tubes requiring a highly stable supply are used to detect radiation in the X-ray region. For satellite experiments where the equipment is operating for perhaps a year, dry batteries are not stable enough and they have an intolerably large temperature coefficient.

The generator supplies 1,600 V, stabilised by a corona stabiliser tube to within 1·5 V, against a primary supply change of ±15 per cent about 6·5 V. The output from a single transistor oscillator, working at about 8 kc/s, is stepped up by a transformer and voltage quadrupler, rectified and smoothed, the ripple amplitude on the output being less than 0·005 per cent. The power consumption of the unit is about 80 mW from the nominal 6·5 V supply. The current is telemetered to obtain a measure of the output voltage, as it would be inconvenient to measure the 1·6 kV directly.

The unit is housed on a 5½in diameter board, the components being coated with polysulphide rubber before encapsulation in foamed resin to a depth of 1in. The foamed resin successfully suppresses corona discharge from high potential points during the launch phase while the pressure is being reduced to the vacuum in orbit. The potted unit is screened by a copper-coated top board and an edge screen of copper foil. The unit has been satisfactorily tested over the pressure range from 1 atmosphere to 0·3 micron of mercury.



Bristol Aircraft's e.h.v. generator for research satellite

INDUSTRIAL NEWS *[continued*

Coal Survey

One of the important operations of the National Coal Board is its assessment of the extent and characteristics of coal deposits in this country. This work is carried out by the Board's Scientific Department which took over the Coal Survey of the D.S.I.R. in 1947. To date over 20,000 analyses of coal seams and several thousand additional measurements of seam sections have been made. The results have been shown in folios of maps relating to the characteristics of at least one seam from each of the Board's nine Divisions and others are being prepared.

Each indicates the structure and extent of the seam as a workable deposit; the nature of the coal—type, calorific value, carbon and hydrogen content, coking properties, etc.; and the amount and nature of the impurities in the coal. The N.C.B. claims that while other great coal-producing countries quickly followed the British lead none of them as yet can match the detailed and systematised information contained in the folios.

MIDLAND SILICONES' £1 MILLION PLANT EXPANSION

More than £500,000 worth of new plant is being brought into operation this month at the Barry factory of Midland Silicones, Ltd., and work is in hand on additional production equipment representing a further investment of a similar amount. The new installations which are just starting production include a plant for manufacturing methyl chloride; a new direct process unit for the production of chlorosilanes; and a new silicone fluids production unit.

The capital construction programme now in progress will provide the following facilities: New plant to manufacture emulsions for use as release agents and for the treatment of textiles and paper; a further direct process reactor; additional distillation columns; and new production equipment for the manufacture of various siloxane intermediates.

Lightning Arrestor Exports

Orders for distribution and line type lightning arrestors have been placed with E.M.P. Electric, Ltd., by supply authorities in Mexico, Greece and India amounting in value to about £78,000.

TRADE ANNOUNCEMENTS

Dewrance & Co., Ltd., announce the formation of the Dewrance Metals Division. This will consist of the foundry at Hillington and the Special Alloys Division in London. The new division will have its own board of management and will be responsible for the production and sales of high quality non-ferrous castings, nickel alloy castings, stainless steel castings, "Endewrance" hardfacing and high temperature brazing alloys. The production executive is Mr. J. B. Morton (Hillington) and the sales and technical executive is Mr. E. Wallace (London).

The board of **Heating Investments, Ltd.,** has been reconstituted. Mr. D. S. Eaton, Mr. K. G. Crack, A.M.I.E.E., and Mrs. E. C. Smith have resigned but Mr. Crack is continuing as technical consultant. Mr. A. C. Meech remains a director and Mr. B. H. Gosling and Mr. R. J. McCreery have joined the board, the former as company secretary and the latter as chairman.

Aveley Electric, Ltd., have been appointed sole U.K. agents for the range of measuring, testing and control instruments made by the Bach-Simpson Co., of Canada. The instruments which will be available to the British market will include multi-range test equipment, panel mounted control indicators, frequency and running time meters, components, educational instruments, radio and TV service equipment, laboratory apparatus, oscilloscopes and a wide range of portable instruments.

Bylock Electric, Ltd., announce that they have acquired from the receiver of Vactric, Ltd., the Vactric and National Appliances Repair Service covering washing machines, vacuum cleaners, floor polishers and refrigerators manufactured by these organisations.

Luxram Electric, Ltd., have appointed Mr. D. C. Drury as representative for the Eastern Counties to succeed his father, Mr. W. L. Drury, who recently died. The address of the depot is still 195, Cavendish Street, Ipswich.

Mr. W. R. Owen has been given responsibility for Cardiff and Manchester branches of **Honeywell Controls, Ltd.,** in addition to continuing as Birmingham branch manager. This follows the transfer of Mr. T. Jackson and Mr. R. Robson from Manchester and Cardiff, respectively, to head office positions at Greenford. Mr. Jackson will now be field sales manager for heating, ventilating and air conditioning controls in commercial buildings. Mr. Robson will be market sales manager for the metal processing industries. There are two other new market sales managers: Mr. E. R. Amery, for the chemical industry, and Mr. H. Wigman, for the food and fibre industries.

The range of "Maylec" conduit accessories available from **Leslie Maynard, Ltd.,** has been extended to include all types of saddles, including spacer bar, distance and hospital patterns, and locknuts and crampets.

Grelco, Ltd., have appointed J. & D. C. Macpherson as their agents in Scotland.

Platinum Metal Applications

A pamphlet produced by the Baker Platinum Division of Engelhard Industries, Ltd., 52, High Holborn, London, W.C.1, illustrates and briefly describes some of the industrial uses of platinum metals. These include thermocouples, resistance thermometers, electric furnace windings, electrical contacts, potentiometer windings and electroplating. A useful feature is a chart giving some properties of the various platinum metals—platinum, iridium, osmium, palladium, rhodium and ruthenium.

ANGLO-U.S. AIR RADIO COLLABORATION

Marconi's Wireless Telegraph Co., Ltd., and the Wilcox Electric Co., Inc., of Kansas City, have signed an agreement for collaboration in the field of airborne radio and radar equipment. The agreement covers the full interchange of design, engineering and production information and includes the manufacture and sale by either company of equipment designed by the other.

Elliott-Automation in Sweden

The formation of a new subsidiary in Sweden, A.B. Elliott-Automation, is announced by Elliott-Automation, Ltd. The group has built up a substantial volume of trade with Sweden, particularly in connection with automatic control equipment for the paper-making industry and the nuclear power programme.

Nationalised Industries

FINANCIAL AND ECONOMIC OBLIGATIONS

By **D. J. BOLTON**, M.Sc.(Eng.), M.I.E.E.

IN the Government White Paper published last week ("The Financial and Economic Obligations of the Nationalised Industries," Cmnd. 1337, H.M. Stationery Office, price 1s), which was briefly referred to in last week's *Electrical Review,* it is pointed out that in the 12 to 15 years since the passing of the various nationalising statutes, whilst particular industries have been reported on by the Herbert and Fleck Committees and by the Select Committee on Nationalised Industries there has been no general review of the manner in which the economic and financial principles laid down in the statutes have been applied in practice. Moreover throughout these years there has accumulated a body of experience and administrative practice which can now be gathered up and clarified so as to form a code of practice for the future.

In the light of this experience, and after consulting the Boards of the nationalised industries, the Government has now reviewed the whole field in order to see how the principles that are laid down in the statutes can most appropriately be applied in the future to the existing nationalised bodies and to the Post Office with its new status.

BALANCES ON REVENUE ACCOUNT AND GENERAL RESERVES

Authority	Yearly results £ million						Unallocated Reserves and Revenue Balances Carried forward at the end of 1959	
	1954	1955	1956	1957	1958	1959	£ million	As a percentage of capital employed at the end of 1959
National Coal Board ...	− 3·5	− 19·6	12·8	5·3	3·5	− 24·0	− 52	—
Gas Council and Boards ...	1·9	0·8	3·8	2·8	− 1·5	− 2·4	25·5	4·4
Electricity Authorities and Boards (England and Wales)	18·8	12·2	11·7	16·1	27·3	26·7	127·2	6·5
Electricity Board (South of Scotland)		0·6	1·2	0·5	0·27	0·1	2·6	1·9
Electricity Board (North of Scotland)	0·3	− 0·8	− 0·2	—	− 0·1	− 0·03	− 0·8	—
British Transport Commission	− 11·9	− 30·6	− 54·4	− 63·5	− 89·0	− 73·8	− 350·6	—
British European Airways ...	1·06	0·61	0·06	1·08	0·23	1·7	2·28	4·4
British Overseas Airways Corporation	− 0·03	0·85	0·59	− 3·19	11·36	− 0·29	− 13·25	—
Post office	Up to 1955–56 the Exchequer received any surplus		− 3·1	+ 2·6	+ 8·7	+ 20·9	27·2	3·1
Total surplus or deficit ...	+ 6·6	− 35·9	− 27·6	− 48·9	− 69·0	− 51·1	− 231·9	—

It is recognised that the Boards occupy an intermediate position between a social service on the one hand and a purely commercial undertaking on the other. Whilst each Board has certain non-commercial obligations, some of which are inherently uneconomic and unremunerative, it is nevertheless expected to take these in its stride and to pay its way over the whole field. What is more, it was hoped that over the years the undertakings would be able to make some profits in the ordinary sense of that term, and so accumulate reserves. For a variety of reasons (many of which have been outside the control of the undertakings themselves) their financial performance has generally fallen short of these hopes.

Profits and Losses

The Electricity Acts require revenues to be not less than sufficient to meet outgoings "taking one year with another," but they do not say how many years to take. Similar requirements occur in the other nationalisation enactments. Clearly, it would be unreasonable to expect any unbalance to be corrected within a year or two, but the period over which an average of surpluses and deficits is struck must not be unduly prolonged. Under the new arrangements a five-year balancing period is specified.

The actual performance of the various Boards over the past six years is illustrated in the accompanying table. It will be seen that the minus signs are as common as the plus signs and in fact the penultimate column represents a very substantial overdraft owing to the losses on the railways. More informative are the figures in the last column which show the accumulated savings as a percentage of the capital employed. With the English Electricity Boards heading the list at 6·5 per cent the only other industries to show perceptible profits are the Gas Boards and British European Airways at 4·4 per cent and the Post Office at 3·4 per cent. Moreover, even these slender margins were obtained only with depreciation provided for on a somewhat less onerous basis than the one which is proposed for the future.

Depreciation Provision

The Electricity Acts require the Boards to provide out of revenue for the redemption of capital and for depreciation of assets or renewal of assets. The word "and" was doubtless slipped in on the principle of asking for twice what one expects to get, and it has been tacitly ignored by the Boards themselves. If insisted on, it would amount to providing for depreciation twice over, and would ultimately result in the getting rid of capital liabilities altogether.

The basis of the depreciation provision is not specified in the Acts, but the Electricity Boards have based it on the "historic" (i.e. the actual) cost of the assets, not their replacement cost. On the other hand, the life estimates on which the provision has been based are, in general, conservative, and there is a supplementary reserve towards the extra cost of replacements.

The new interpretation which is to be put upon the Acts calls for three things:—

(a) Depreciation provision on the historic cost basis.

(b) Additional provision sufficient to cover the excess of depreciation calculated on replacement cost basis.

(c) Allocations to reserve available towards capital development and as a safeguard against premature obsolescence.

It will be seen that (a) and (b) merely amount to saying that depreciation has to be provided for on a replacement cost basis, and it is difficult to see why this could not have been said. As regards provision (c) life estimates for depreciation purposes should always cover the obsolescence risk appropriate to that particular appliance. The additional reserve will, however, serve as an insurance against over-optimistic life estimates. The five-year balancing period is to start from now, and undertakings will not be required to make good any under-provision that may have occurred under the old basis.

The clause in the Act about redemption of capital is now given a decent burial, and what has been the practice from the first now becomes legitimate—which shows that one need never despair of an Act provided one can secure the right " interpretation."

Capital Investment and " Self-Financing "

No change is proposed in the mechanism of Government control of the capital investment programme, but the various arrangements have been codified and set out in a form applicable to all the nationalised industries. (Their operation in electricity supply was described in these pages on 25th November, 1960.) Briefly, there is to be Government approval of the general lines of the programme for five years ahead. In the light of this the Government will fix an upper limit on the amounts to be spent on investment during the two years ahead, and will approve borrowings on the basis of an annual estimate submitted by the undertaking. In addition, the Government is to be kept informed of any proposed capital investment in projects which are expected to yield a relatively low return.

Stress is laid on the importance of the nationalised industries making a substantial contribution towards the cost of their capital development out of their own earnings and so reducing their claims on the nation's savings and the burden on the Exchequer. It is, however, recognised that in the past these industries have been pressed to keep their prices down in the national interest, and have largely succeeded. The utmost that can be done by way of improved efficiency will not increase the proportion of capital that can be provided from reserves without some increase in prices.

Commercial Objectives

While the framework of the proposed requirements is to be the same for all the nationalised industries the figures to be fitted into the framework may be different in different cases. The objective for each undertaking will be determined in the light of its own circumstances, needs and capabilities, including the proportion of commercially unprofitable activities which have to be carried out. For some, the objectives may be expressed in terms of progress towards an appropriate level of self-financing of their capital expenditure. For others, the objective may be in terms of a specified rate of return on capital employed.

All this sounds highly reasonable, but there is one important qualification that must be made, one caveat that must be entered. If competing industries are to be judged by different standards and are required to meet different commercial requirements depending on their particular situations how can they compete on level terms ? If, for example, the several fuel industries offer alternative heating services which are in effect financed on different bases will not the consumer's freedom of choice be prejudiced thereby ?

E.C.A. CONFERENCE

A RATHER fuller programme than usual has been arranged for this year's conference of the Electrical Contractors' Association to mark the Association's diamond jubilee. The conference is being held at Torquay from 1st to 6th June. It will start on the evening of Thursday, 1st June, with a " Get Together " at the Imperial Hotel and on the following morning the business proceedings will begin with a civic welcome followed by the address of the president, Mr. C. R. Waterhouse. Then the annual meeting will be held and, if necessary, will be continued on Saturday morning, 3rd June. The Friday afternoon session will be devoted to a symposium, " The Past, the Present and the Future," at which the co-ordinator will be Mr. J. G. Briggs (past-president) and the speakers, Messrs. L. C. Penwill, director (" The Past "), A. V. Milton, past-president (" The Present ") and S. L. M. Barlow, past-president (" The Future "). In the evening there will be a reception by the Mayor and a dance at the Town Hall.

Saturday and Sunday will be free (apart from the possible continuation of the annual meeting), but the president invites members to join him at morning service at the Upton Vale Baptist Church.

On Monday morning (5th June) there is to be a discussion on " Trading Problems and Scope for Co-operation," co-ordinated by Mr. S. F. Steward, director of the British Electrical and Allied Manufacturers' Association. The speakers will be Messrs. J. D. Johnson (Simplex Electric Co., Ltd.), R. W. S. Mackay (Midland Electric Manufacturing Co., Ltd.), C. H. Broughton Pipkin (British Insulated Callender's Cables, Ltd.) and C. J. W. Scott (Crompton Parkinson, Ltd.).

Mr. W. J. Jones will present a paper on " Better Office Lighting " at the afternoon session and the discussion will be opened by a member of the Illuminating Engineering Society (whose new code was reviewed in last week's issue). There will follow the installation of the new president and the usual votes of thanks. Mr. and Mrs. Waterhouse will hold a reception in the evening.

Arrangements for Tuesday, 6th June, are to be announced later.

Electricity Supply Industry 1961-62

THE total capital requirements of the Electricity Council and Boards (in England and Wales) are expected to rise to £317 million in the financial year 1961-62 compared with an estimated expenditure of £285·4 million in 1960-61. The capital requirements of the North of Scotland Hydro-Electric Board are forecast at £14·6 million for 1961-62 compared with £10·9 million in 1960-61, whereas those of the South of Scotland Electricity Board are expected to fall from £27·9 million in 1960-61 to £25 million in 1961-62. Details of how these capital requirements will be financed are given in the table.

FINANCING OF CAPITAL REQUIREMENTS

	Electricity Council and Boards (England and Wales)			North of Scotland Hydro-Electric Board			South of Scotland Electricity Board		
	1959–60	1960–61 (estimate)	1961–62 (forecast)	1959–60	1960–61 (estimate)	1961–62 (forecast)	1959–60	1960–61 (estimate)	1961–62 (forecast)
Fixed investment	311·3	292·7	308·4	13·4	10·9	14·4	26·0	26·0	25·0
Other investment	6·5*	3·5*	9·4*	—	0·1	—	—	—	—
Changes in Working Capital	(—)13·3	(—)10·8	(—) 0·8	1·0	(—) 0·1	0·2	1·2	1·9	—
Total Capital Requirements	304·5	285·4	317·0	14·4	10·9	14·6	27·2	27·9	25·0
Financed by:									
Internal Resources	124·1	124·1	158·4	3·5	4·0	4·3	7·2	9·8	8·3
External Resources other than from the Exchequer†	(—) 9·2	8·0	1·0	(—) 2·6	(—) 2·2	(—) 2·3	(—) 1·1	(—) 0·4	(—) 0·1
Net Borrowing from the Exchequer	189·6	153·3	157·6	13·5	9·1	12·6	21·1	18·5	16·8
Total finance	304·5	285·4	317·0	14·4	10·9	14·6	27·2	27·9	25·0

* Nuclear fuel. † Mainly bank borrowing.

The figures are taken from a new White Paper "Government Expenditure Below the Line" (price 1s 6d) which shows that Government loans to the nationalised industries, to other public bodies, for overseas assistance and to private industry are expected to rise by £34 million to £575 million in 1961-62. The main item is the Exchequer advances to the nationalised industries which are expected to fall from £416 million in 1960-61 to £385 million in 1961-62. One reason is the reduced requirements of the British Transport Commission, but there is also to be a further rise in the proportion of self-financing by the other nationalised industries. In 1961-62 the electricity supply industry expects to provide 50 per cent of its total capital requirements from internal resources compared with 44 per cent in 1960-61.

Capital expenditure by the Gas Council is expected to rise slightly to £48·2 million next year after falling from £54·5 million to £47·9 million in 1960-61. In 1961-62 the Gas Council expects to provide 72 per cent of its capital requirements from internal resources.

The figures given in the table for fixed investment and investment in nuclear fuel by the Electricity Council differ slightly from those in the White Paper issued in November. Expenditure on nuclear fuel is lower due to the incidence of payments to the Atomic Energy Authority. The change in fixed investment "is due to small increases in expenditure on conventional and nuclear capacity as a result of retiming of contract payments." In addition, the industry's latest plans, at present under consideration by the Minister, indicate that, "in order to meet increased costs and to keep pace with the faster growth of electricity demand now being experienced, it may be necessary to spend a further £6·2 million in 1961-62 on the distribution system." The present figures for 1961-62 do not include this further expenditure.

C.E.G.B. Reorganisation

ALTERATIONS are being made in the regional structure of the Central Electricity Generating Board; the changes are being made gradually and may be spread over two or three years. The present rather cumbersome designations of the Regions are being reduced to simpler form and the names of the Divisions changed to some extent.

The North West, Merseyside and North Wales Region will be styled North Western Region. The North Eastern and Yorkshire Region will become simply the North Eastern Region; the North Eastern Division will be termed the North Eastern Division and the Yorkshire Division the Southern Division of that Region.

The Midlands and East Midlands Region will be the Mid'ands Region and its two Divisions will be West Midlands (now Midlands) and East Midlands (as at present). The Eastern, London and South Eastern Region will be known as the South Eastern Region; the London Division will disappear and the two other existing Divisions will be termed North Thames (now Eastern) and South Thames (now South Eastern). Their boundaries will be essentially coterminous with the Thames North and Thames South Grid Control areas.

The Southern, South Western and South Wales Region will be called the South Western Region and the existing Divisions—South Wales, South Western and Southern—will retain their present names.

In all Regions, except the North Western, it is proposed to set up a Regional Transmission Construction Department under a regional electrical engineer, to deal with transmission construction work in the field. The Divisions will be concerned entirely with the operation and maintenance of the power stations and transmission lines in their areas. The officer in charge of each Division will be entitled "assistant regional director" and will be a member of the Regional Executive Committee. In each Region there will be a deputy regional director who will deputise for the director when necessary but will normally be the chief engineer of his Region.

NEW ELECTRICAL EQUIPMENT

AEROSOL LUBRICANT DISPENSER

A 6 oz aerosol dispenser now available in the United Kingdom, priced 22s, will convey lubricant in a fine spray directly on to working commutators, switches, contacts, etc. Designated No. 2A, it combines the actions of Electrolube No. 1 and No. 2 in loosening tarnish, lubricating and spark inhibiting. A 5in "snorkel" extension is also provided for directing the spray into inaccessible places. Further information and a 20-page illustrated technical booklet are available from **ELECTROLUBE, LTD.**, 16, Berkeley Street, London, W.1.

ELECTRO-PLATING RECTIFIER EQUIPMENTS

A series of "Davenset" germanium rectifier equipments for electro-plating, anodising and cleaning has been announced by **PARTRIDGE, WILSON & CO., LTD.**, Davenset Electrical Works, Evington Valley Road, Leicester. The units consist of an auto-wound regulating transformer for varying the output voltage, a double wound step-down transformer with an earthed copper screen between windings that effectively prevents the mains voltage from appearing at the plating bath, and germanium rectifiers connected in a six-phase, double-star network.

The standard form of control consists of rotary switches connected to a series of tappings on the auto-wound transformer. These switches enable the plating current to be controlled, on load, by regulating the voltage in a series of steps from 25 per cent to maximum output. Two such switches are fitted to provide 15 steps, and three switches to provide 63 steps.

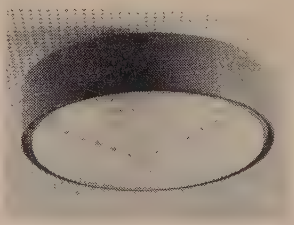
For some applications a finer degree of control is required, and the tapped auto-transformer and switches are replaced by a smoothly variable regulating transformer employing a contact brush which traverses the winding. Where a fixed output voltage is required, the auto-wound regulating transformer and switches are omitted. An h.r.c. fuse is connected in each phase of the a.c. supply and each arm of the rectifier is protected by a rapid action fuse. The diodes are also protected against transient over-voltage by an a.c. surge suppression circuit. Six models are available with current ratings from 250 to 10,000 A and output voltages of 8 or 16 V.

LIGHTING FITTINGS

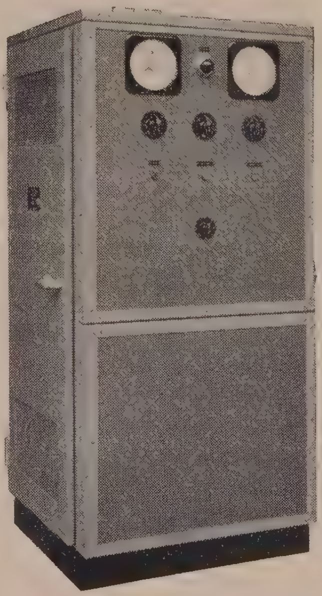
A new range of "Drum" lighting fittings is announced by **MERCHANT ADVENTURERS OF LONDON, LTD.**, Hanworth Estate, Hampton Road West, Feltham, Middlesex. The fittings are available from 5 to 18in in diameter for 40 to 200 W lamps and they can be fixed individually or in groups of up to nine lights. Wall brackets are also available to match.

An interesting feature of these units is the diffusing louvre made in opal urea formaldehyde which has a high light transmission, freedom from discoloration, will withstand high temperatures and being non-static does not attract dust. The concentric design gives good downward illumination with a cut-off of 45° to screen the lamp from normal viewing angles.

The "Drums" are finished in several attractive stove enamelled colours, including red, yellow, grey or matt black, and the metalwork and mountings are finished in satin silver. A fully-illustrated leaflet (L.1900) and prices are available from the company.



Type MA2136H fitting from Merchant Adventurers' "Drum" series

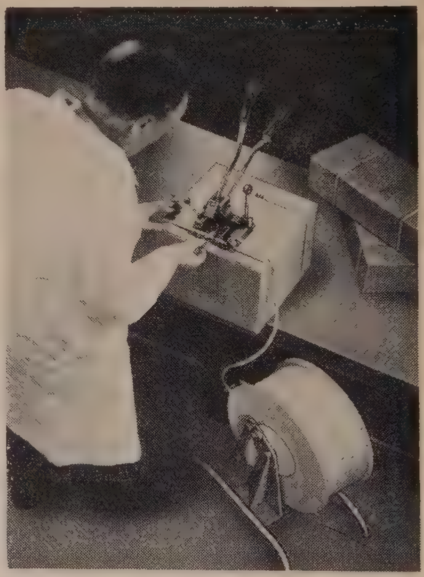


Partridge, Wilson "Davenset" electro-plating rectifier equipment

STRAPPING TAPE

A new non-metallic strapping tape is being introduced this month under the trade name "Tufstrap" by **P. P. PAYNE & SONS, LTD.**, Haydn Road, Nottingham. It will also be marketed by Automatic Strappings, Ltd., of 44, Uxbridge Road, Ealing, London, W.5, under their own brand name—"Multiband Super." It will be available initially in two widths, ¼in and ⅜in with other widths up to 1in to follow.

"Tufstrap" is a heavy duty strapping material manufactured from natural and man-made fibres, and is suitable for use on palletised loads, such as "flatted" fibreboard containers, fluorescent tubes, rolls of cellulose



"Tufstrap" strapping tape manufactured by P. P. Payne & Sons, Ltd., is supplied on a handy floor dispenser for ease of application. Here the operator is shown fixing a seal in position. The strapping tool handles are then brought forward over the seal and the two handles opened to their fullest extent. This crimps the seal, at the same time cutting off the end of the tape

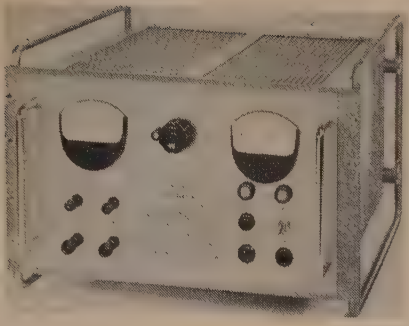
film, rolls of waxed paper and a variety of other packs. Being soft and flexible, it is claimed to give greater conformability than steel, and cannot injure the hands or, when used for baling textiles, it does not cut into or stain the fabric. It can also be used for securing refrigerators, radiograms, washing machines, kitchen equipment, furniture, etc., without risk of harmful results to their enamelled or polished surfaces.

A floor dispenser is available for ease of application and the tools and dispenser can be obtained on rental terms and serviced and maintained by Payne's engineers.

MOTOR SPEED CONTROLLER

An adjustable speed drive which has been rationalised to provide a wide range of alternative ratings and control characteristics is announced by Lancashire Dynamo Electronic Products, Ltd., Rugeley, Staffs. This Series BMC.1 drive is supplied complete with motor and remote mounting control station for speed adjustment. The equipment, in ratings from 1 to 3½ h.p. and having a speed control range of 10:1, ensures good regulation of motor speed with fluctuating loads. Optional features include reversing and dynamic braking and on all models full protection against overload of the motor and control equipment is provided by built-in current limit protection. Motors are available having various enclosures and a wide range of base speeds and can also be supplied with gear-heads where required.

TRANSISTORISED D.C. POWER SUPPLY


Aveley Electric "Konstanter" d.c. power supply unit

A recent addition to the Gossen range of "Konstanter" power supplies has now been introduced into the United Kingdom by Aveley Electric, Ltd., Ayron Road, Aveley Industrial Estate, South Ockendon, Essex. The unit is a heavy-duty, fully transistorised high stability d.c. voltage source for operation from a 40 to 60 c/s a.c. supply. It has a voltage range from 5 V d.c. (12 A) up 66 V d.c. (5·4 A) continuously variable. Warm-up time from no load to full load is 0·2 msec and ripple voltage is 1 mV. The instrument has good stabilisation characteristics and incorporates an electronically controlled automatic circuit-breaker and thermal overload protection. The maximum permissible ambient temperature at full load is 30°C. The "Konstanter" is available as a rack-mounted or bench-type instrument.

COOKER HOTPLATE CONTROL

With the Sunvic "Panostat" cooker hotplate control recently introduced by Associated Electrical Industries, Ltd., Instrumentation Division, P.O. Box 1, Harlow, Essex, the temperature of the contents of any type of pan can be automatically maintained at a predetermined level. The temperature selected when the control knob is at the maximum setting is the safe normal maximum for cooking fat, so that the fat cannot reach a temperature in the "flash zone." In the case of foods such as milk, which can easily boil over, or burn, the heat applied must be gradually reduced as the desired temperature level is approached. The "Panostat" achieves this by means of a patented anticipatory device, incorporated in the switch head, which gives a proportional reduction in power as the contents of the pan reach the desired temperature.

The "Panostat" has a switch head, which can be placed anywhere on the cooker, and a sensing unit, connected by an oil-filled capillary tube. The hydraulic sensing unit is situated in the centre of the hotplate and is sprung so that a rigid oil-filled capsule is in intimate contact with the base of the pan.

A rise in the temperature of the pan's contents is sensed, through the bottom of the pan, and causes the oil contained in the rigid capsule to expand. This expansion is transmitted via the capillary tube to a flexible diaphragm contained in the switch head. The motion of this diaphragm is transmitted to a micro switch, also contained in the switch head, by a proportioning device; thus the heat energy supplied to the hotplate is regulated by the fluctuations of temperature of the contents of the pan.

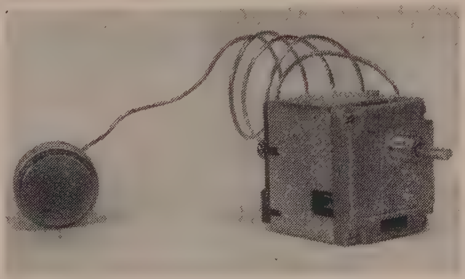

Sunvic "Panostat" type THP hotplate control

TABLE LAMP

The new "Caprice" table lamp now being produced by Duncan, Partners & Price, Ltd., 33, Petergate, London, S.W.11, is styled on modern lines with a base manufactured in mild steel with a non-tarnish brass finish. The legs are of wood with an ebonised finish and the fitting is supplied complete with flexible and line switch. The shades are made of "Poly-Opal" and are obtainable in red, white, yellow, lilac and green.

Also available is a matching pendant fitting, similar in design to the table lamp except that in place of the legs the fitting is supplied with a length of circular white p.v.c. flexible, lampholder and ceiling plate cover. The colours of the shade are the same as

"Caprice" table lamp (Duncan, Partners & Price)

for the table lamp. Both fittings are priced at £1 4s 5d each, including purchase tax.

COOKER CONTROL UNIT

The new cooker control unit recently introduced by Nettle Accessories, Ltd., Warren Street, Stockport, Ches., comprises a main switch for the control of the cooker, with a 13 A switched socket outlet. The main switch is double pole, rated at 45 A, a.c. only. The switch terminals are each provided with two terminal screws, and the wiring holes are large enough to accommodate up to 7/·052 conductors.

Nettle Accessories 45 A cooker control unit

The unit is available for either flush-mounting or surface-mounting, and can be supplied either with or without neon indicator lamps on both switch and socket positions. The flush-mounting unit is designed to fit into a standard 2-gang B.S. 1299 type box, thus allowing the contractor to terminate his supply wiring in the kitchen with a box of smaller dimensions than the B.S. 1833 type.

For surface mounting the flush type is used, with an all-insulated mounting pattress. The pattress can be fixed directly on to a B.S. 1299 box or screwed to the wall surface.

The units are available in ivory finish only and the respective prices are:—Surface-mounting, £1 9s (£1 without neon); and flush-mounting, £1 7s (18s without neon).

Hospital Lighting Fittings

A NEW series of lighting fittings designed specifically for use in hospitals is announced by Atlas Lighting, Ltd., Thorn House, Upper St. Martin's Lane, London, W.C.2. Hospital lighting presents entirely different problems from those encountered in commercial and industrial installations and in the design of the fittings special attention has been given to glare problems and brightness levels within the vicinity of patients, whilst maintaining adequate general lighting.

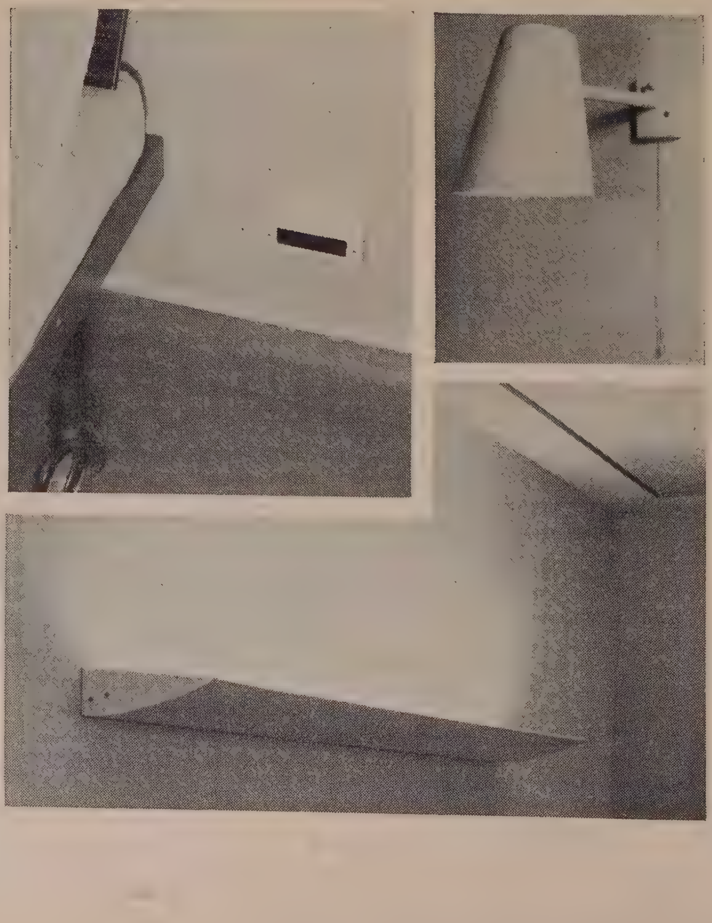
The "Amenity" pendant fitting, available in 4ft or 5ft versions, gives mainly indirect light distribution, and uses two fluorescent tubes mounted on each side of a totally enclosed control gear channel. There are no glass enclosures and the gear tray should not normally require opening. The louvring on the underside of the fitting is easily removable and is finished dark grey to restrict brightness.

Another fitting is an incandescent bedshade lamp using either a 60 or 100 W lamp, operated by a pull-switch, and incorporating a 15 W "Pygmy" lamp as a "watchlight" for observation of the patient's face by night, operated by a push-button on the lamp base. It is supplied complete with a switchplate unit.

A night light is fitted with a 15 W tungsten lamp, and is designed for mounting at low level between or under beds. A special system of louvring prevents any distracting light reaching the patients. Lateral spread of light is a flat beam of 120°, all light being emitted below the horizontal. It measures only 7½in by 3in by 5¾in and a recessed version is available.

Another fluorescent fitting is a combined bed-head lighting unit which provides both general lighting of the ward and local light on the bedhead. This effect is achieved by the use of two separate tubes—one in the upper part of the fitting to throw light ceilingwards, the other giving only direct downward light, being separately switched at the option of the patient. It is available for flush or recess mounting or may be fitted with outreach arms to suit special nursing purposes.

For general lighting in wards, waiting rooms, etc., a series of cove units, in 2ft, 4ft and 5ft sizes, has been designed for upward lighting only. There are two basic types—one having remote control gear, the other with the control gear inside the chassis. Twin-tube "tandem" versions can also be obtained.



Three of the new Atlas hospital lighting fittings. Top left: 15 W low level night light. Top right: Bedshade fitting. Bottom: Wall mounting cove unit for upward lighting

The Engineer in Commonwealth Development

GRAHAM CLARK LECTURE BY THE DUKE OF EDINBURGH

NEARLY 800 members of the three senior engineering Institutions heard the Duke of Edinburgh deliver the seventh Graham Clark Lecture in the Great Hall of the Institution of Civil Engineers on 13th April. A further 300 members watched the Duke on closed circuit television in the lecture theatre of the Institution, while other overflow meetings, with closed circuit television, took place at the Institutions of Mechanical and Electrical Engineers.

The chairman, Professor Owen Saunders, president of the Institution of Mechanical Engineers, introduced Prince Philip, who said that he was most grateful to the Institutions of Civil, Mechanical and Electrical Engineers for inviting him to give the lecture. The original title was to have been "Resources, Human and Material, of the Commonwealth," but, said the Duke, he soon came to the conclusion that resources were not very interesting until you started doing things to them, and engineers were probably the biggest group of people who did things to resources. He therefore changed the title to "The Engineer in Commonwealth Development." Before the commencement of the lecture, all those attending were given a booklet containing appendices which included several interesting and illuminating tables concerned with Commonwealth resources and development.

The Duke said that he took it for granted that material development in the broadest sense was a good thing, but it did not necessarily imply a higher standard of human civilisation. This, he believed, depended upon qualities of the mind and spirit which were not directly related to material comfort and convenience.

Given the need for development in the material sense it did not take a great stretch of the imagination to visualise the engineer's part in the process. There were, in particular, four ways in which the engineer could implement and influence development, namely:—

(1) By continually finding practical ways and means of applying scientific principles and discoveries in power, industry, transportation, communication and construction. This meant that research establishments were needed in all the divisions of engineering so that practising engineers could apply the benefits of fundamental scientific research.

(2) By the application of the latest and most efficient methods to individual projects. This meant that practising engineers had to have some way of keeping up to date.

(3) By the careful administration, maintenance and improvement of the engineering complex. Building or developing some project from scratch might have a great many difficulties, but maintaining and improving a project which had been in existence for many years called for even more skill and administrative ability. He thought that railways were a very good example.

(4) By the technical training and education of the next generation of engineers. This was very much the engineer's responsibility and whatever the rewards of practice might be, nothing was more worth while in the long run than teaching the next generation.

The engineer was the means by which the people were able to enjoy the fruits of science, whether in building new projects, or in maintaining and keeping up to date what was already in existence. It was hardly necessary to list the highly-developed communities of history which had decayed for lack of engineers to keep their great works in operation.

Simple technical "know-how" was not good enough. To make a really worth-while contribution, the engineer needed the vision to appreciate what was possible as well as the technique to realise his dream. It was also wrong to assume that the engineer was simply concerned with material gadgetry or the purely practical and commercial side of life. All large-scale projects and modernisation plans were bound to have a profound and lasting influence upon the lives of very great numbers of people. Unless their conception, execution and running were all based upon a practical humanity they would contribute very little to man's progress.

That was why technological training had to be combined with a broad general education. Each generation had to learn that technical knowledge without a sense of mission and responsibility was wasted. Education which merely produced a sense of dissatisfaction and frustration and a kind of topsy-turvy snobbery about what was suitable and unsuitable employment was a failure. The system had to instil a sense of the deep value of engineering to human development so that people came to look upon it with the same sense of service as missionaries and doctors.

At the root of all development were the nation's natural resources; they were the raw materials with which engineers had to work to fill the basic needs of the peoples of the world. The wealth of a nation, and all which that implied, depended upon the efficient organisation of its resources both natural and industrial as well as human. In this organisation the engineer bore the chief responsibility. The engineer had two kinds of resources with which to work. There were the renewable resources, those which grew or were renewed by the climate; and the non-renewable resources, those which were extracted once and for all. The Duke then considered food production and agriculture, mentioning mechanisation and irrigation, in particular.

Energy Resources

Hand-in-hand with agriculture to supply the world's basic needs was energy. Energy was the very basis of modern civilisation. Cheap, convenient and abundant power ranked with food as a means of raising the standards of living.

The non-renewable sources of energy were coal, oil and natural gas. The renewable sources were the sun, wind, water, wood, cow dung and ultimately the breeder reactor in nuclear power. Also, for the time being, a very large proportion of the energy requirements for transport and agriculture was met by animal power. Distributed power in the form of electricity and gas, and dependent power units in the form of internal combustion engines were essential to high productivity in agriculture, transport and industry, and were most convenient for personal use in the home and on the roads.

The Duke then referred to the *per capita* consumption of commercial fuels in Commonwealth countries, which varied from 5·2 metric tons of coal equivalent in Canada to 0·06 in Pakistan. It was obvious that there was a very real urgency to increase the energy production and distribution in the Commonwealth.

Australia was very short of water for all purposes. The Snowy River scheme would do much to meet immediate demands for energy and irrigation, but there were virtually no other sources of hydro-electric energy on the continent. Fortunately, she had considerable resources for the production of nuclear energy.

New Zealand, on the other hand, had fairly large reserves of water power, but they happened to be on the South Island, whereas the greater part of the population was on the North Island. The New Zealand Government were about to call for tenders to lay power cables across the Cook Strait and this was expected to cost about £19 million. Engineers had also made it possible to harness the geothermal steam in the North Island to energy production.

India had great reserves of coal, but they happened to be mostly on one side of the sub-continent, while power was badly needed in many distant places which had no alternative sources. Unfortunately, the cost of transporting the coal or the electrical energy was prohibitive so that there might be openings there for nuclear power stations. In Canada, the situation was that 85 per cent of her electricity was provided by hydro-electric stations and she had still only tapped 28 per cent of her resources of water power.

Industry and Research

It was becoming increasingly popular to look upon industry merely as a convenient way of giving employment, but that was not its basic function. Industry existed for three reasons:—(1) It produced those things which were needed by a community to live a reasonably comfortable existence; (2) it also produced those things which, though not essential to human existence, were very nice to have; and (3) it produced things which could be sold to other countries, preferably at an overall profit. There could be no doubt that in the long run there was a greater chance of avoiding conflict if the material standards of people throughout the world were reasonably comparable. This was a problem for the engineer.

All progress in engineering, said the Duke, depended on scientific research. There were two aspects of scientific research as far as the engineer was concerned. First, there was the fundamental and applied research which provided the engineer with new materials and techniques and with new applications of known principles. Secondly, there were the huge research instruments which had to be designed and built by engineers to enable the scientist to continue his investigations.

Many of the great strides in engineering history had been made before scientific research was used deliberately to find new techniques. Recently, however, we had come to think of science as producing the new ideas and engineers as the means of exploiting them. So much so that we were inclined to forget that much scientific research was only possible with the aid of very advanced engineering. Computers, electron microscopes, accelerators, radio telescopes and satellites were no longer bits of apparatus that could be knocked up in the lab.

Technical Training

Referring to education and training, the Duke said that UNESCO estimated that the number of university students per million of the population in Britain was the lowest in Europe. Educational plans for Britain have yet to be matched in that unhappily large section of industry which still did not provide sufficient effective training for its young recruits. It was with this situation in mind that the City and Guilds of London Institute agreed, at the Duke's suggestion, to run a Commonwealth Technical Training Week at the end of May and the beginning of June this year. There had been a most encouraging response from all Commonwealth countries and it was hoped that the Week's activities would attract the attention of young people, their parents and employers to the need for technically trained people and to the ways and means of getting that training.

In conclusion, the Duke said that the engineer was the key figure in the material progress of the world, but unbalance between different countries in material progress was not likely to improve the chances of peaceful conditions. The gap in material progress could only be reduced by a co-operative effort by engineers and it was the Duke's hope that the engineers of the Commonwealth would work together in a spirit of trust and friendship to increase the material standards and prosperity of the Commonwealth.

Sir Willis Jackson, immediate past-president of the Institution of Electrical Engineers, moved the vote of thanks to the Duke of Edinburgh for his lecture.

WELDING ELECTRODE GUIDE

THE British Electrical and Allied Manufacturers' Association has published a revised 100-page edition of its " Guide to Arc Welding Electrodes." The guide was first published in 1944 and this is the sixth edition, giving in a convenient form classified lists of British electrodes and a key to American and British electrode standards. To assist consumers in choosing the correct electrode for a particular application a brief description is included of the British Classification of Electrodes, published by the British Standards Institution as B.S. 1719 : 1951.

In this issue a more complete description of the American method of classifying electrodes is given, and the equivalent American code numbers are shown in all the classified lists. For those interested in electrodes for welding non-ferrous metals, cast iron, corrosion-resistant and other steels, a section is included which gives information on and lists of the special electrodes available. Copies of the guide, price 5s, are available from the B.E.A.M.A., 36, Kingsway, London, W.C.2.

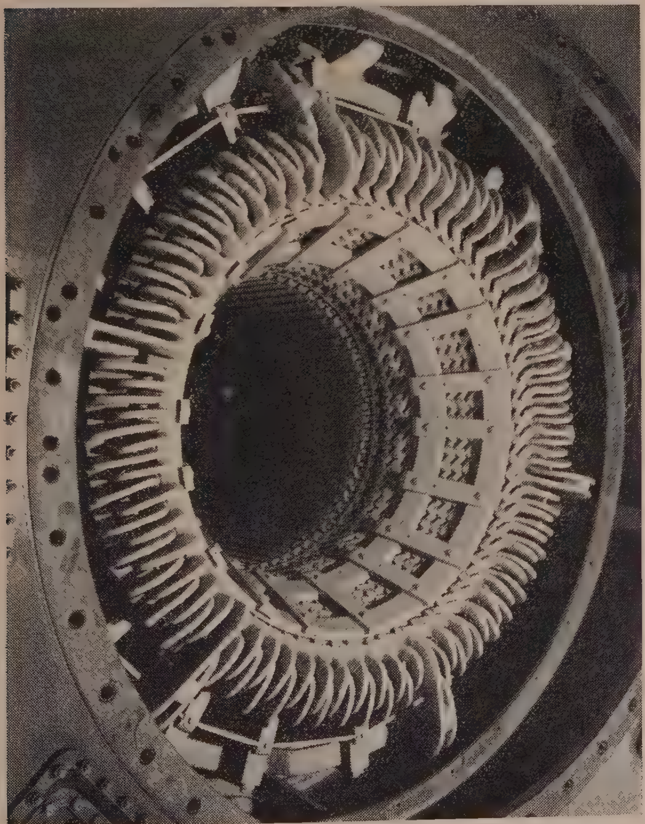
Magnetic Fields in Turbo-Generator End Windings

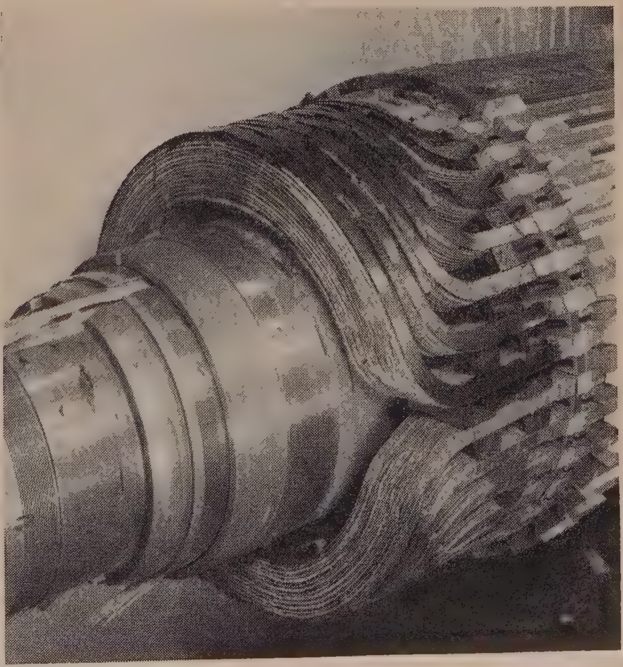
Authors' summary of the papers "The Calculation of the Magnetic Field of Rotating Machines, Part 2: The Field of Turbo-Generator End Windings," by D. S. Ashworth, B.A., and P. Hammond, M.A., M.I.E.E., and "The Magnetic Field of the End Windings of Turbo-Generators," by P. J. Lawrenson, M.Sc., Graduate I.E.E., presented at a meeting of the Supply Section of the Institution of Electrical Engineers on 12th April

It has been appreciated by designers for a great many years that their knowledge of the effects occurring at the ends of large machines, particularly turbo-generators, is inadequate, and recently the need to change this state of affairs has become extremely important. During the last ten years the output of individual turbo-generators has increased fivefold and, since the physical size of the generator has been largely limited by mechanical considerations, this has resulted in greatly increased current loadings. Consequently there have been considerable increases in the stray-load losses—with the attendant risk of developing local hotspots—and, also, in the forces developed between the end windings especially under short-circuit conditions.

All of these end effects result directly from the so-called "stray" magnetic field in the end region and, in investigating them, it is necessary to study first the nature and distribution of this field. However, due to the extreme complexity of the end structure of the machine this study is a very difficult one. The windings in which the currents generating the field flow are of complicated shape—the stator end conductors take the form of involutes laid on the surface of a cone and the rotor end winding consists of concentric turns (see Figs. 1 and 2). Moreover, the fields are modified by the surrounding metal structure—the rotor body and shaft, the end plate and the machine casing—which have parts, some laminated and some not, with differing permeabilities and resistivities. Clearly no exact mathematical analysis of the end field accounting for all these influences is possible at present or is foreseeable. However, it is possible to strip the problem to its bare essentials and to investigate some of its basic features, for example, the influence of the winding shape, the end plate permeability, the air gap and the operating power factor. Attempts to do this are described in the two papers which differ primarily in the way that the currents in the end windings are represented.

In one the windings are first replaced by their central filaments (a simplification which introduces negligible error) and these in turn are approximated very closely by





Figs. 1 and 2.—The ends of a typical stator and rotor, showing the windings

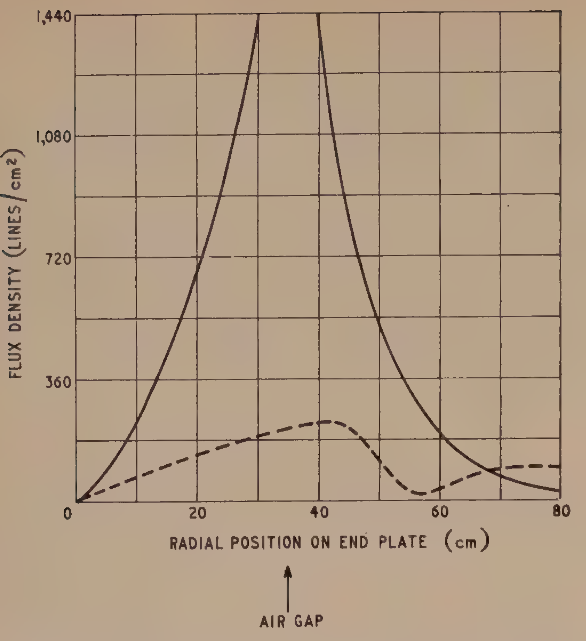


Fig. 3.—Influence of the air gap: field on the end plate at full load stator current (806 A)

chains of connected short straight sections. Expressions are derived which give the field strength at any point in terms of the current in a typical straight section and these are used simply and quickly, with the aid of a digital computer, to sum the field, at the desired points, due to all the sections replacing the central filaments of the winding. It is possible, in practice, since all the coils are alike, to calculate the field of a single stator winding coil and to synthesise the field of the complete winding by using distribution factors.

In the second method the currents of the winding are considered as flowing in thin sheets between the two winding layers: a cylindrical sheet replaces the slot portion and a conical sheet the end winding though, for convenience, the latter is considered in the calculation as a series of steps. Just as air gap flux density is found to have a predominantly sine-wave distribution, so also it is found that the current on the above current sheets can be well represented by a sine-wave distribution. Equations are developed for the magnetic field of these sinusoidal current distributions and then, by their use, the field of the complete winding is evaluated.

These two methods of representing the windings lead, for a given problem, to results which are in close agreement. They have been used in conjunction to examine in detail some of the main features of the field distribution over the end plate and rotor coil retaining ring surfaces of a 7 MW turbo-generator. So far as the winding design is concerned a number of general features appear from the results. The fundamental and harmonic components of field on the end plate are both decreased by increasing the straight projection of the winding and by reducing its cone angle. The same changes increase field components on the rotor coil retaining ring. (It is to be noted, of course, that only the harmonic fields induce loss in this ring.) The type of end plate affects the field in various ways. A highly permeable end plate leads to strong fields normal to itself, but these components of field can be reduced by the use of a non-magnetic end plate. Eddy current screening of the end plate, if perfect, would completely eliminate these field components, but would also increase fields parallel to its surface. Thus, any decrease achieved in end plate losses by screening may be offset by increased losses in other structural parts, particularly the winding copper.

Two particular features of the end field which are of considerable interest are the influence of the air gap and the influence of operating power factor. To see what is meant by the first of these it is useful to consider the total end field as the sum of two components. The first of these is due to the end windings assumed to be entering the machine end in which the air gap is infinitesimally small, and the second is due to the presence of the gap and the resultant magnetomotive force acting across it. Fig. 3 shows a plot of field strength against radial position on the surface of a highly permeable end plate with the machine axis as origin: the dotted curve is the field of the end windings alone and the continuous curve is the field including the effect of the gap. It will be seen that this second curve is much the higher of the two, so indicating the great influence of the gap and what is effectively its " fringe " field. It is to be realised that if eddy current screening of the whole end plate were complete, there would be no fringe field.

An investigation of the influence of power factor is of particular importance since it is known that hotspots are liable to occur on the machine end structure during operation at leading power factor. Assuming constant MVA, the total field on the end plate has been found for various power factors by vectorial addition of calculated fields of stator and rotor windings (Fig. 4 shows the radial component). It is seen that the resultant field is constant in

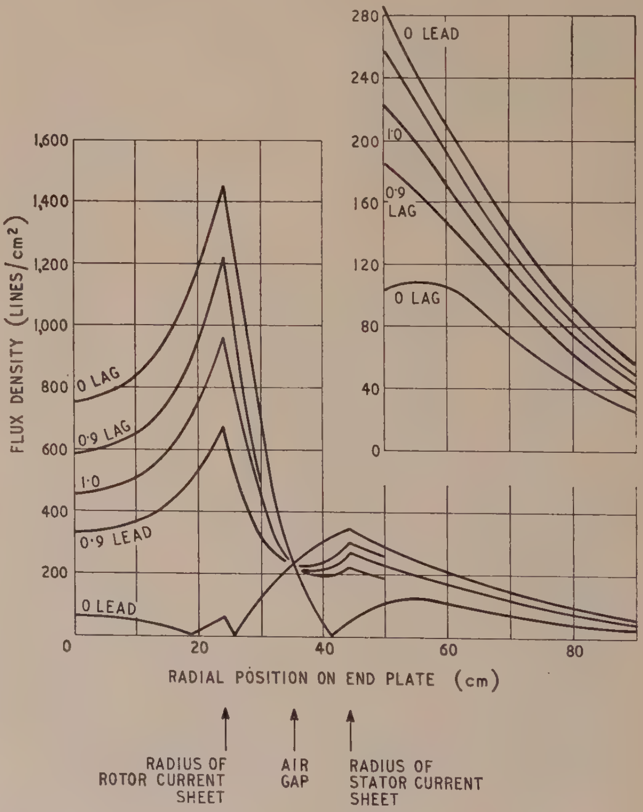


Fig. 4.—Total field on the end plate at different power factors and constant MVA

the air gap (as it must be for constant voltage) and over the end plate a stronger field occurs at the leading power factor, since the excitation, and so the opposition of the rotor to the stator field, is then reduced.

No attempt is made in the papers to calculate the magnitude of stray loss or of forces acting on the windings. The latter of these can be done simply but there are no reliable means of doing the former. At present all that can be said is that if a strong field acts normal to a conducting surface it produces a greater loss than a weak field acting similarly. Even so, examination in this light of the results presented should go some way to improving the designer's knowledge of important end effects. This is particularly so where experimental information about field and loss distribution is available and can be studied in conjunction with the theoretical results.

Discussion

In opening the discussion Mr. V. J. Vickers said he was disappointed that the only reference to the effect of the rotor retaining ring was that it was non-magnetic and could be neglected. Problems associated with the production of large non-magnetic rings tempted one to use magnetic material but the resulting stray loss could be very large, though detailed changes in design on modern machines reduced the difference to some extent. He suggested that the effect of the rotor shaft, dismissed by Mr. Lawrenson because it was small and far removed from the stator winding, was large if a substantial magnetic disc was mounted on or near it to support the outer end of the retaining ring.

Mr. F. R. L. Creak said that the ampere-turn loading of the machines had increased considerably over the last few years and end heating might prove to be the limiting factor. The axial fringing fields did not cause as much heating trouble as the field behind the slot in the main part of the end plate. He took exception to Mr. Lawrenson's remarks with regard to stator end plate flux shields. Experiments had been disappointing with regard to loss but encouraging in the reduction of end plate temperatures. Higher rating machines had been made with separate end plates and separate tooth support fingers. The main part of the end plate, of magnetic material, was covered by a fairly substantial copper screen across the main surface and between end plate and winding. Temperature rise in the end plate was reduced to about one-third of what might be expected with a comparable non-magnetic cast iron end plate, so that the rating could be increased by a factor of about 50 to 60 per cent. Recent tests on a water-cooled machine showed that it was possible to separate out fairly accurately the extra eddy losses in the stator winding, and it was then apparent that there were more losses in the iron structure surrounding the end windings than in the windings themselves. It would be useful if Mr. Lawrenson's work on harmonic losses in the retaining ring could be extended.

Mr. C. J. Carpenter felt that the work relied too much on the treatment of the magnetic field as a circuit problem and too little on its treatment as a field problem. The important point was not so much to take account of the curvature or precise shape of windings when calculating the field at the end plate but rather to simplify the winding and so simplify the analysis of the field.

Mr. V. Easton felt there was inconsistency in the conclusions drawn in the two papers. The first paper suggested that the axial component of the field was less important than the radial and tangential fields, since the axial field actually decreased as the power factor approached unity and became more leading. The temperature rise curve for constant power kVA corresponded approximately to the shape of the radial and tangential components. In the second paper, the suggestion was that the axial component was the loss component on the end plate. Tests had been carried out on a hydrogen cooled machine and the increase in stray loss due to using magnetic end bells was less than 10 per cent. Applying direct cooling, the output had been increased by a factor of about 2, and though the stray loss went up, the effect of the magnetic end bells was approaching 5 per cent more. He suggested that, in certain conditions, the use of magnetic end bells was not as bad as Mr. Vickers suggested.

Mr. A. Hunt thought that ignoring the presence of iron surfaces in the first paper, and ignoring all but the core end and rotor end surfaces and considering only briefly the effect of the air gap in the second paper, led to undue emphasis being put on the radial and tangential components of the end winding field. The presence of the air gap, together with the high permeability of the core and rotor end surfaces, caused those components to disappear and the axial component of flux became much larger. Therefore, it was the prime cause of end plate and core losses. He also said that the Americans had tried Mr. Lawrenson's suggestion that the core end plate might be screened by laminated "flux divertors," but without much success. Presumably the losses in the divertors largely offset any reduction in loss in the end plate.

End Winding Losses

Mr. D. C. MacDonald said that losses in the end windings fell into two classes: local eddy-current losses within individual strands due to the leakage field in the end windings; and, in a Roebel bar wave winding, strands in parallel had different leakage reactances, the distribution of load current between the strands was non-uniform and the loss throughout the length of the winding was increased. It had been said that the end winding field on multiple machines was less than on two-pole machines and the end losses were not so significant. Search coil measurements to obtain flux densities in the end regions, and loss measurements by the initial rate of rise of temperature method, made on recent machines showed that the end plate loss was small in a well-designed machine with the pole about the same length as the stator. But there was considerable loss in the end windings due to the field produced by the currents in them. The losses could amount to about one-fifth of the d.c. copper loss on some water-wheel alternators and were probably greater on turbo-alternators.

Mr. A. E. J. Reece felt that in the first paper the authors were unwise in trying to draw conclusions relating to a machine from results obtained for such an idealised situation. They dismissed the work of Smith and Honsinger, which took account of boundary conditions, by saying that the results were very difficult to interpret. He doubted whether the results were likely to prove more difficult to interpret than those the authors would obtain when boundaries were taken into account. The explanation that for a given electric loading the field values were greater for a two-pole than for a four-pole machine was valid for coils entirely in air, but in the practical case where there were permeable boundaries much of the flux path was in iron. It seemed that the most significant reason for the larger fields of the two-pole machine was the increased ampere-turns per pole acting between the iron surfaces.

He also thought that Mr. Lawrenson's assumptions in the second paper about boundary conditions were only partly justified. Analogue studies showed that the rotor shaft and magnetic components mounted on it could have considerable influence on the end zone flux distribution. The effect of those components was likely to be particularly important when considering end winding eddy current losses, inductance and forces.

Financial Section

STOCKS and SHARES

THIS year the industrial markets of the Stock Exchange maintained full steam ahead as they approached closely to Budget day and it was only in the last week before the event that the customary signs of heightened caution appeared. Price movements then became irregular, and the volume of dealings contracted to an extent suggesting that with the Chancellor's decisions now known a good deal of pent-up business will be released into the channels of investment considered to be most favoured by his proposals. Otherwise the main influence upon prices has been the flow of dividend and profits announcements from the many companies now reporting their 1960 results. Among these the statement from C. A. Parsons made an outstandingly good impression.

C. A. Parsons' Good Results

An initial rise of as much as 9s, to 70s 3d, in the price of C. A. Parsons £1 shares registered the degree of satisfaction with which the company's preliminary statement on the results for 1960 was received in the market. A final dividend making for the year a total of 12½ per cent (against 9⅜ per cent for 1959) was more than had been expected, and the 50 per cent expansion in group profits (before tax and transfers) came as an even more agreeable surprise when considered in the light of last year's trading conditions. There is a very much larger tax provision this time, but the net surplus still gives almost fourfold cover for the larger distribution, on the basis of which the yield on the shares goes up to over 3½ per cent.

B.I.C.C. Capital

Results announced by British Insulated Callender's Cables for 1960 were very much in line with anticipations and an initial setback of some 2s 9d to 56s 3d in the price of the £1 shares was attributed to the unexpected notice of capital issues to come. Terms of these offers, which will raise a total of about £15 million in the form of debenture stock and new ordinary shares, are to be announced shortly. Meanwhile the figures for last year show a 12 per cent expansion in Group sales, and trading profits just about level with the previous year's. After a lower tax charge the net surplus again provides more than twofold cover for the 13½ per cent dividend, which gives the shares a yield of a fraction over 4¾ per cent. Some evidence of recent improvement in profit margins has appeared and this is of course one of the points on which Sir William McFadzean's comments are awaited with special interest.

Simon Engineering Dividend

Simon Engineering have been prominently in the news, firstly with the

Price Changes in

Company or Board	Nom. Value	Middle price 17th April	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %			1961 Highest	1961 Lowest
Gilt-edged Stocks						£	s	d		
Brit. Elec. 1968/73	100	74½		3	3	4	0	6	74¾	73¾
Brit. Elec. 1974/77	100	70		3	3	4	5	9	70¼	69½
Brit. Elec. 1976/79	100	72½x.d.		3½	3½	4	16	6	73½	71½
Brit. Elec. 1974/79	100	81		4¼	4¼	5	5	0	82	80½
Brit. Elec. 1967/69	100	91		4½	4½	4	19	0	91½	89½
Overseas Electric Supply										
Calcutta Elec.	£1	22/-	+1/-	7†	7½†	11	2	6	22/-	20/6
East African Power	£1	14/6		8	10	13	16	0	15/-	13/3
Nigerian Elec.	£1	16/6	−1/6	8	10	12	2	6	19/9	15/6
Perak Hydro-Elec.	£1	20/-		10	10	10	0	0	20/-	17/6
Electrical Shares										
Aberdare Holdings	5/-	15/9		17½	17½	5	11	0	16/-	14/3
Aerialite	1/-	7/6		54	54	7	4	3	7/6	6/9
Allen, W. H.	£1	39/-	+6d	14	10*‡	5	2	6	39/-	36/-
Allied Insulators	5/-	9/6		20	10*	5	5	3	9/6	8/9
Alwyn Holdings	5/-	26/6		—	12½	2	7	3	27/-	24/6
Anglo-Portuguese Tel.	£1	19/-	−2/-	9	9	9	9	9	25/-	19/-
Arcolectric	1/-	5/6		15	15	2	14	6	6/-	3/9
Aron Meters	£1	70/-		15	15	4	5	9	70/-	67/6
Assoc. Elec. Ind. Ord.	£1	48/-	+3/3	15	15	6	5	0	48/6	39/6
Automatic Tel. & El.	5/-	19/9		17	17	4	6	0	19/9	14/9
Babcock & Wilcox	£1	36/3	+2/6	13	9	4	19	3	36/6	30/3
Bakelite	10/-	57/-	+1/-	17½	17½*	3	1	6	57/-	42/-
Baldwin, H. J.	2/-	1/6		10	Nil		—		1/6	1/6
Berry's Electric	5/-	48/9		30	30*‡	3	1	6	49/-	37/-
Bowthorpe Holdings	2/-	9/6		27	18½*	3	17	9	9/6	8/-
Brit. Elec. Resistance	2/-	8/-	−3d	17½	17½*‡	4	7	6	8/9	6/6
Brit. Elec. Traction:										
Def. Ord. "A"	5/-	54/6	+6d	35	40	3	13	6	54/6	41/9
Brit. Electronic Ind.	5/-	15/3	+6d	—	15‡	4	18	3	15/3	12/3
B.I. Callender's	£1	56/3	−2/9	13½	13½	4	16	0	59/-	49/6
B.I. Callender's 6% Pref. ...	£1	17/6		6	6	6	17	3	18/3	17/6
British Thermostat	5/-	35/-	−1/3	35	20*	2	17	3	40/-	28/-
Brook Motors	10/-	49/6		25	25*	5	1	0	49/6	47/-
Bulgin, A. F.	1/-	10/6	+3d	55	40*	3	16	3	10/6	7/9
Bulpitts	5/-	23/-		15	16¼	3	10	9	26/3	16/9
Burco Dean	5/-	9/6		18	15	7	18	0	10/-	8/9
Cable & Wireless	5/-	17/6	−1/9	10	10*‡	2	17	3	19/3	12/6
Cambridge Instruments ...	5/-	36/9	+9d	12½†	22	3	0	0	36/9	30/-
Chloride El. Storage "A" ...	£1	83/9	−3/3	17½	20	4	15	6	91/-	72/-
Clarke Chapman	£1	53/9		13¾	13¾	5	2	3	54/-	43/6
Combined Elec. Mfrs.	4/-	9/6		—	12½‡	5	5	3	9/6	7/6
Contactor Switchgear	5/-	15/-	−6d	14	14	4	13	3	16/-	14/6
Cossor, A. C.	5/-	6/6		5	Nil		—		8/-	6/6
Crabtree	10/-	31/-	−3d	20	12½*	4	0	9	33/9	26/3
Crompton Parkinson	5/-	13/6		14	12½*	4	12	6	14/-	11/3
Davis & Timmins	5/-	44/6	+3/-	25	35*	3	18	9	44/6	30/3
De La Rue	10/-	64/3	+3/3	22½	22½‡	3	10	0	64/6	55/-
Decca "A"	10/-	65/6	−4/-	20	23⅛	3	11	3	69/9	52/3
Desoutter	5/-	61/-	+4/9	30	35	2	17	6	56/3	49/-
Dewhurst	2/-	10/3		20	20	3	18	0	10 3	7/6
Dictograph Tel.	2/-	11/9		20	20*	3	8	0	12/-	8/6
Dimplex	5/-	66/-	−1/6	—	30	1	18	0*	71/-	47/9
Dubilier Condenser	1/-	3/-		25	30	5	0	0*	3/-	2/3
Duport	5/-	15/9		17½	20	4	4	3*	16/-	12/6
E.M.I.	10/-	49/-	−1/3	20	17½*	3	11	6	51/3	41/6
Eleco	2/-	8/6	+3d	20	20	2	7	0*	8/6	4/3
Electrical Apparatus	5/-	17/3		14½	20	5	16	0	17/9	17/-
Electrical Components	5/-	9/6		15	11½*	6	1	0	9/6	9/-
Elec. Construction	£1	37/6	−1/3	9	9	4	16	0	39/-	30/6
Eliott-Automation	5/-	36/3	+3/9	9·3	12‡	1	13	3	36/6	25/6
Enfield Rolling Mills	£1	46/-	−2/6	15	15	6	10	6	51/6	45/6

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

announcement of a final dividend making 27½ per cent for 1960, followed shortly by the report of big contracts, jointly with I.C.I., for installations in Czechoslovakia and other Soviet satellite countries. The dividend improves upon the forecast of 26⅔ per cent made at the time of Simon-Carves' merger with Henry Simon, and appears from the preliminary figures to be covered twice over by the net surplus of £1·3 million. Having been marked up to 40s, the £1 shares were on a yield basis of nearly 3½ per cent.

Electrical Investments

Company or Board	Nom. Value	Middle price 17th April	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £	s	d	1961 Highest	1961 Lowest
Electrical Shares—continued						£	s	d		
English Electric	£1	37/9	+9d	10	10	5	6	0	40/9	32/-
English Electric 3¾% Pref. ...	£1	11/-		3¾	3¾	6	16	6	11/9	11/-
Ericsson Tel.	5/-	31/3	+2/6	13†	13†	3	8	0	31/6	23/3
Ever Ready	5/-	35/-	−1/6	27½	20*	2	17	3	36/6	31/6
Falk Stadelmann	£1	26/-	+1/-	10	7½	5	15	6	26/-	21/9
G.E.C.	£1	38/3	+1/3	10	10	5	4	6	40/-	29/3
G.E.C. 6½% Pref.	£1	18/9		6½	6½	6	18	9	19/3	18/3
General Cables	5/-	5/6	−3d	15	Nil		—		6/3	3/9
Goblin (B.V.C.)	5/-	7/6		12½	10	6	13	3	8/6	6/-
Hackbridge Holdings	5/-	5/9	−6d	20	20	8	14	0*	6/9	5/-
Harland Engineering	5/-	17/6		14	16*	4	11	6	19/-	15/6
Head Wrightson	5/-	28/-	+3/-	20	14*	2	10	0	30/-	22/-
Heatrae	2/-	15/6		20	22½	2	18	0	15/6	12/6
Holophane	5/-	19/9		26	30	7	12	0	19/9	17/3
Hoover	5/-	53/9		90	45*	4	3	9	53/9	46/-
Hunt, A. H.	4/-	24/3		20	20	3	6	0	25/9	18/-
Intl. Combustion	5/-	31/3	+3d	30	30	4	16	0	31/6	24/-
Intl. Computers & T.	£1	96/-		10	11¼	2	7	0	99/-	59/-
Johnson & Phillips	£1	20/3	−6d	5	Nil		—		22/9	17/6
Kenwood Mfg.	1/-	5/9	—	—	—		—		6/-	5/3
Laurence Scott	5/-	18/9		15	15*	4	0	0	18/9	15/3
Lister, R. A.	£1	55/-		14	14	5	1	9	55/-	47/3
Lucas, J.	£1	67/6	+9d	12½	13¾	4	1	6	67/6	62/-
Marryat & Scott	2/-	17/-		22½	27½	3	4	9	17/-	13/9
Mather & Platt	£1	43/9	−9d	11	11	5	0	6	51/6	41/6
Metal Industries	£1	64/6		14	15	4	13	0	64/6	53/-
Midland Elec. Mfg.	£1	63/9	−6d	12	12	3	15	3	64/3	58/6
Murex	£1	46/6	−1/-	15	20	4	18	0*	47/6	39/3
Newman Ind.	2/-	6/-		12½	15	5	0	0	6/-	5/-
Oldham & Son	1/-	3/-		175	17½*‡	5	10	0	3/-	2/3
Parsons, C. A.	£1	70/3	+9/-	9⅜	12½	3	11	3	70/6	46/9
Philips' Lamps	Fl.10	245/-	−15/-	16	16*	1	6	0	£13¼	£10½
Plessey	10/-	59/6		15½‡	17‡	2	17	0	60/-	46/6
Pullin Group	2/-	15/-	+6d	25	25	3	6	9	15/-	11/3
Pyrotenax	5/-	61/3	+2/6	34	40	3	5	3	61/3	46/6
Radiation	£1	37/6	+3/-	6	12	6	7	9	37/6	31/6
Reliance-Clifton	5/-	27/6		15	15	2	14	6	27/9	22/6
Reyrolle	£1	49/-	+3d	175	9⅜*	4	0	0	49/-	36/6
Richardsons Westgarth	10/-	8/3	−6d	8⅓	8⅓		—		7/-	6/6
Sangamo Weston	10/-	34/-	−6d	12½	13⅓	4	0	0	34/6	26/3
Scott, James	5/-	26/6	+9d	24	25*	4	14	3	27/9	25/6
Simon Engineering	5/-	40/-	+2/-	—	27½	3	8	9	40/-	28/-
Smith (England), S.	4/-	22/3		17½	20	3	12	0	22/3	17/-
Southern Areas	£1	18/3	−9d	5	6	6	11	6	21/-	14/6
Strand Elec.	5/-	18/3	−9d	14·6	20‡	5	9	6	20/-	12/3
Sturtevant	5/-	15/6		15†	15†	7	19	0	18/6	13/9
Sun Elec.	5/-	17/3		15	18½	5	7	3	17/6	17/-
T.C.C.	10/-	41/-		35	22½*	5	9	9	41/-	40/-
Telephone Rentals	5/-	28/3		12½	15*	2	13	0	28/3	21/9
Thompson (John)	5/-	14/3	−9d	25	20	7	0	3	16/9	14/-
Thorn Elec.	5/-	62/6		20	25	2	0	0	63/-	44/6
Thornycroft	£1	28/-		6	6	4	5	9	34/9	25/9
Tube Investments...	£1	82/6	−2/6	—	14	3	8	0	85/-	72/6
Ultra Electric	5/-	20/-	−2/-	20	25	6	5	0	23/6	12/6
Walsall Conduits	4/-	14/3	+3d	22½	15*	4	4	3	14/3	10/9
Ward & Goldstone	5/-	35/9		30	35	2	9	0*	36/6	25/6
Watford	2/-	8/9	+3d	25	20*	4	11	6	10/9	8/6
Westinghouse	£1	41/9	+9d	11	11	5	5	3	42/-	36/-
West, Allen	5/-	13/9		12½	12½*	4	11	0	14/6	11/6
Wilkins & Mitchell	5/-	14/-		17	21*		—		15/3	11/9
Wolf Electric	5/-	17/6		12½	13¾	3	18	6	17/6	14/-

Company News

Newman Industries 2s shares retained their rise to 6s on the strength of last year's 29 per cent expansion of profits (before tax) and the dividend of 15 per cent, which is 2½ per cent more than the rate to which it was raised a year ago. This puts the shares on a yield basis of 5 per cent and, in accordance with the directors' customarily conservative dividend policy, leaves more than two-thirds of the distributable surplus to be retained in the business. Having advanced spectacularly in the last month or two from about 13s to 23s, Ultra Electric 5s shares reverted to 20s, while discussion developed around the company's agreement to sell 40 per cent of the Electronics subsidiary's capital to American interests. Elliott-Automation are expected to announce their results early next week: the shares rose strongly in advance of the event.

Increased Interims

A 50 per cent rise this year in the price of Strand Electric Holdings 5s shares, quoted recently at 18s 3d, is said to have been associated in part with investment interest in the company's television lighting activities, and it was underpinned recently by the declaration of an increased interim dividend on account of the year ending this month, together with a forecast that the total would be made up to 20 per cent. This would represent in effect a rise of more than 8 per cent. Recent activity at rising prices up to 8s 6d in Eleco 2s shares was supported by the declaration of a second interim of 7½ per cent, making a total equivalent to 11¼ per cent so far for the 15 month period to next June. There was a total of 10 per cent for the twelve months to March, 1960.

Chairmen's Views

Terms of a "rights" issue of new shares by Wolf Electric Tools are expected to be announced at the company's annual meeting early next month. Meanwhile the chairman tells shareholders in the annual report that in the first quarter of the current year trading has been fully maintained at the high level of activity which produced record results last year, and an increase in the dividend from 12½ to 13¾ per cent. Telegraph Condenser (a subsidiary of B.I.C.C) reported moderate reductions last month in both the earnings and the dividend for 1960, and in the full report now published the chairman does not encourage firm hopes of an immediate resumption of progress.

REPORTS and DIVIDENDS

British Insulated Callender's Cables, Ltd., is maintaining its dividend at 13½ per cent for 1960 with an unchanged final dividend of 9½ per cent and proposes to raise approximately £15 million by issues of debenture stock and ordinary shares.

The issues are being made in order to replace short-term borrowing and to provide additional working capital. The debenture stock will be offered to the public for subscription, with preferential consideration being given to applications from present holders, and the ordinary shares will be offered on a one-for-seven rights basis. The terms will be announced shortly.

Group sales for the year expanded from £128 million to £143 million, but the trading surplus is little changed at £9·02 million. The tax charge is lower at £2,593,344, against £2,851,491, and the net profit is up from £3·53 million to £3·65 million, subject to exceptional items which bring the total net profit to £4·6 million.

C. A. Parsons & Co., Ltd., are increasing their dividend from 1s 10½d to 2s 6d per £1 share for 1960 with a final dividend of 1s 7½d. Group profits rose sharply from £3,478,690 to £5,267,063. The net profit is up from £2,209,114 to £2,699,666, after a substantially increased tax charge of £2,387,397 against £1,269,576 and after placing £180,000 (nil) to contingencies reserve.

Eleco, Ltd.—Announcing a second interim dividend of 7½ per cent, making the equivalent of 11¼ per cent to date for the 15 months' period to 30th June, 1961, the directors of Eleco (formerly Engineering & Lighting Equipment) say they consider this dividend amply justified by results to date and future prospects. A total equivalent to 10 per cent was paid for the year to 31st March, 1960.

Holders were told last December, when the accounting date was changed, that a final dividend for the period would be declared towards the end of 1961.

Telegraph Condenser Co., Ltd.—At present it appears that the prospects for the current year are somewhat less favourable than those of a year ago, says the chairman, Mr. W. C. Handley. The immediate outlook for leading manufacturers of popular home entertainment appliances is not encouraging, and, Mr. Handley says, "I am afraid that we must expect the demand from manufacturers in some industries to be below the 1960 level." At the same time, he adds, maximum effort will be sustained in developing new products. "We must therefore rely more, at any rate for the present, upon demand for home applications for our industrial types and upon our overseas trade. In both these fields our order book is at a satisfactory level."

Group net profit for 1960 declined from £319,353 to £255,381, and the distribution is 22½ per cent, against the equivalent of 23⅓ per cent. Fixed assets expanded from £572,887 to £969,267. Against current assets of £2,160,187 (£1,990,503) there were current liabilities of £768,725 (£707,651).

G.E.C. and Radio & Allied (Holdings).—Morgan Grenfell & Co., Ltd., announce that their offers on behalf of the General Electric Co., Ltd., for the issued share capital of Radio & Allied (Holdings), Ltd., have been accepted in respect of all of the 6 per cent preference and convertible ordinary shares and more than 90 per cent of the ordinary shares. They are now binding in all respects subject to the granting of the Stock Exchange quotation for the G.E.C. shares to be issued.

Acceptances will continue to be received until further notice. Certificates for the G.E.C. shares and cheques in respect of the cash portion of the offers will be posted not later than 25th April, 1961, in respect of acceptances received to date. It is the intention of the G.E.C. in due course to acquire the remainder of the R. & A. shares under Section 209 of the Companies Act.

U.S. Stake in Ultra Electronics.—Ultra Electric (Holdings), Ltd., has sold 40 per cent of the capital of one of its subsidiaries, Ultra Electronics, for £800,000 to Electronics International Capital, Ltd., a United States holding company registered in Bermuda.

In addition, E.I.C. has agreed to make available five-year loan facilities, bearing interest at the rate of 8 per cent per annum, up to a maximum sum of £950,000. It has already lent £200,000 to Ultra Electronics and the balance is available on the basis that loans on similar terms will be made by Ultra Electric (Holdings) concurrently and proportionately to the shareholdings in Ultra Electronics. This gives total facilities available to Ultra Electronics of £2,075,000.

The directors of Ultra Electric (Holdings) anticipate that these agreements will result in a considerable expansion of Ultra Electronics, Ltd., in all electronic fields. The proceeds of the sale (together with a dividend of £200,000, free of income tax, previously received from Ultra Electronics) will be used by Ultra Electric (Holdings) to reduce its present bank borrowings.

It is also announced that Ultra Electronics has made an agreement with the Electronics Investment Management Corporation of the United States for the interchange of technical and other information in the electronics field.

The Electrical Apparatus Co., Ltd., has increased its interim dividend from 6 to 8 per cent to reduce the disparity between the interim and final dividends. The directors state that the company has a "very good" order book, ensuring an adequate level of production well into next year. It is not possible at present to forecast the profit, but they expect a satisfactory outcome.

Dowding & Mills, Ltd., are raising their interim dividend from 12½ to 16⅔ per cent. On present indications the directors expect the profit for the year ending June to be at least 25 per cent more than that for the previous year.

Davis & Timmins, Ltd.—The group net profit for 1960 was £293,999 (£135,586), after charging taxation, depreciation and interest on unsecured loan stock. The directors recommend a final dividend on the ordinary shares (as increased by the scrip and rights issues made during the year) of 20 per cent, plus a cash bonus of 5 per cent, making a total of 34·1 per cent (against 25 per cent on smaller capital).

The directors also recommend an increase in the authorised ordinary share capital of £250,000 and the distribution, through a capitalisation from share premium account, of one new fully paid 5s ordinary share for every four ordinary shares held.

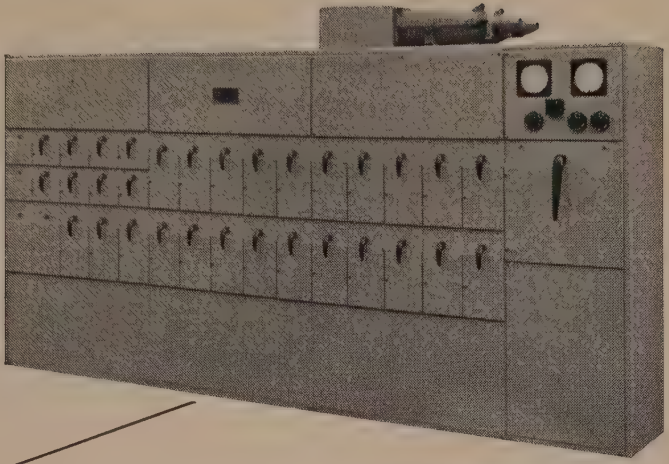
Harland Engineering Co., Ltd.—Group profits declined from £323,635 to £247,290 in 1960, and the net profit from £171,221 to £127,557. The dividend is held at 16 per cent with an unchanged 12 per cent final.

J. & F. Stone Lighting & Radio, Ltd., are paying an interim dividend of 12½ per cent (the same).

British Engine Boiler & Electrical Insurance Co., Ltd.—The company reports a net profit for 1960 of £178,900 (against £221,007 in 1959) and the final dividend of 55s makes 105s

[*Continued on page* 729

VARILECTRIC cubicle switchboards



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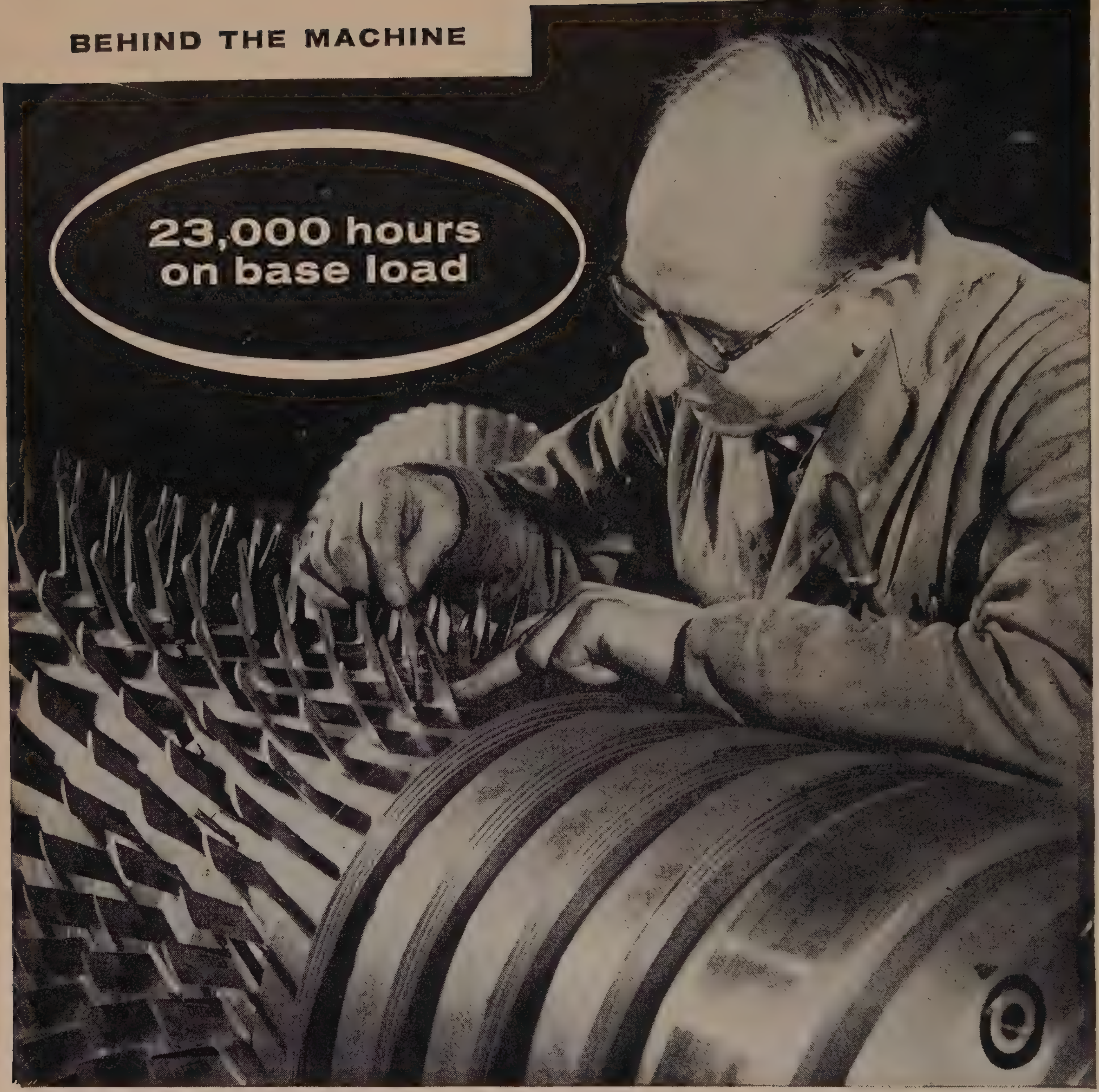

The proved reliability of AEI industrial gas turbines is typified by a machine in Venezuela which has recently completed 23,000 hours running on base load. AEI makes a range of industrial gas turbines with ratings from 1,750 kW upwards designed to run on gaseous or liquid fuels.

The picture shows work on the compressor rotor of L2IC gas turbines being built, at the AEI Turbine-Generator Division Factory for the Basrah Petroleum Co. These feature a single shaft design which ensures stable regulation and makes them particularly suitable for parallel operation with other generating equipment.

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Turbine-Generator Division

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per £5 share (90s). Total assets are £5,505,861 (£4,904,516) and investments at or below cost, less reserve, £3,800,942 (£3,388,833).

George H. Scholes & Co., Ltd., have declared an interim dividend of 5 per cent.

New Companies

R. B. Pullin & Co., Ltd.—Registered 30th March. Capital £100,000. To acquire the goodwill and freehold property and other assets of the business of instrument makers carried on by R. B. Pullin & Co., Ltd., at Phœnix Works, Great West Road, Brentford, and elsewhere, but excepting its holdings of shares in subsidiary companies, etc. The subscribers are R. B. Pullin and P. J. Ellis (company directors). Solicitors: Godden Holme & Co., 5, Upper Belgrave Street, S.W.1.

Ekco Heating & Electrical, Ltd.—Registered 29th March. Capital £1,000. Electrical and heating engineers, etc. Solicitors: Allen & Overy, 9/12, Cheapside, E.C.2.

Ekco Radio & Television, Ltd.—Registered 29th March. Capital £1,000. Manufacturers of and dealers in domestic radio and television receivers, etc. Other particulars are similar to Ekco Heating & Electrical, Ltd.

Anaburn Electrics, Ltd.—Registered 29th March. Capital £100. Electricians, etc. Secretary: Shirley Hart. Regd. office: 713, Imperial House, Kingsway, W.C.2.

M. & E. Electrics (Kettering), Ltd.—Registered 30th March. Capital £500. Manufacturers of and dealers in vacuum cleaners, etc. Secretary: S. H. Lucas. Regd. office: 6, Surrey Street, E.C.2.

Nuclear Developments, Ltd.—Registered 30th March. Capital £100. Manufacturers of, dealers in and agents for nuclear fuels and chemical products of all kinds, etc. Solicitors: Slaughter & May, 18, Austin Friars, E.C.2.

Woods Fans, Ltd.—Registered 24th March. Capital £100. Regd. office: 5, Fenchurch Street, E.C.3.

Mineral Insulated Cables, Ltd.—Registered 23rd March. Capital £100. Manufacturers of and dealers in mineral insulated cables, etc. Regd. office: 4, Bennetts Hill, Birmingham, 2.

S. J. Watson (Electrical), Ltd.—Registered 13th March. Capital £15,000. Manufacturers of and dealers in radio, electrical and mechanical apparatus of all kinds, etc. Directors: S. J. Watson and Kathleen G. Watson. Secretary: Dorothy A. Allchin. Regd. office: 1 and 2, The Pantiles, Biggin Hill.

Datamation, Ltd.—Registered 20th March. Capital £100. Designers, patentees, manufacturers, exporters, importers and distributors of and dealers in electronic, mechanical, electrical and electromechanical equipment and apparatus, etc. Directors: A. G. Baxter and Frances M. Baxter. Regd. office: 133, Moorgate, E.C.2.

C. W. Harvie, Ltd.—Registered 20th March. Capital £10,000. Manufacturers of and dealers in and agents for manufacturers of domestic, household and general electrical equipment, etc. Regd. office: 35, The Bridge, Wealdstone, Harrow.

Hepworth Electrical Developments, Ltd.—Registered 13th March. Capital £100. Manufacturers of and dealers in electrical distribution equipment and electrical and electronic plant, etc. The first directors are J. F. Booth (managing director, Hepworth Iron Co., Ltd.), P. Hinchliff and W. Newman. Secretary: F. Cooling.

House Electrix (Leatherhead), Ltd.—Registered 20th March. Capital £1,000. To acquire the business of electricians, electrical engineers, electrical contractors and electrical distributors carried on by M. J. Lamberth and A. D. Barnett at Great Bookham, etc. Directors: M. J. Lamberth and A. D. Barnett. Secretary: Jean Lamberth. Regd. office: 7, Church Road, Great Bookham, Surrey.

A. Andrews & Co. (Electrical Contractors), Ltd.—Registered 16th March. Capital £2,000. A. Andrews, 37, Ernocroft Road, Marple Bridge, Stockport, is the first director.

Phytron, Ltd.—Registered 27th March. Capital £1,000. Manufacturers, importers, exporters and distributors of, agents for and wholesale and retail dealers in electrical goods of all kinds, radio and television receivers and components, etc. Directors: H. Hohenstein (secretary) and Mrs. G. Richards. Regd. office: Oxford Circus House, 245, Oxford Street, W.1.

C. & J. Evans Brothers, Ltd.—Registered 28th March. Capital £1,000. Electrical engineers, etc. Directors: C. H. Evans, J. Evans and D. D. Evans (secretary). Regd. office: 3a, High Street, Aberavon, Port Talbot.

Security Alarms, Ltd.—Registered 24th March. Capital £500. Manufacturers of and dealers in electrical, electronic and mechanical alarm systems, etc. W. J. Hockley is the first director. Secretary: Elspeth Hockley. Regd. office: 10, Queens Road, Coventry.

W. H. Curtis, Ltd.—Registered 24th March. Capital £10,000. Manufacturers of and dealers in electrically operated goods, radio receivers, etc. Directors: W. H. Curtis and Mrs. Vera Curtis. Secretary: F. G. Scholey. Regd. office: 169, Matilda Street, Sheffield.

"Peta" Electrics, Ltd., and **Petric Electronics, Ltd.**—Registered 27th March. Capital £1,000 each. Manufacturers of and dealers in radio and television sets, etc. Directors: O. P. Welch and P. R. Jeffrey. Secretary: D. B. Berry. Regd. office: 8, Shepperson Street, Derby Road, Nottingham.

J. L. Mason & Son, Ltd.—Registered 22nd March. Capital £2,000. Electrical engineers, etc. Directors: J. L. Mason, Mrs. Millicent I. Mason, M. Mason and Mrs. Betty J. Mason (secretary). Regd. office: Lloyds Bank Chambers, Wolverhampton Street, Dudley, Worcs.

Werner of Leabrooks, Ltd.—Registered 23rd March. Capital £5,000. Electrical contractors, etc. H. E. U. Werner, Leabrooks, Derbys., is permanent director and chairman.

L. Jones (Electrical) Holdings, Ltd.—Registered 24th March. Capital £100. Regd. office: 12, Park Cross Street, Leeds, 1.

Novatron, Ltd.—Registered 30th March. Capital £500. Manufacturers of and dealers in domestic, household and general electrical and other equipment, etc. Directors: R. J. B. Morgan (secretary) and I. E. Halls. Regd. office: 36, Ebury Street, S.W.1.

F. D. Forbes & Co., Ltd.—Registered 21st March. Capital £2,000. Manufacturers of and dealers in electrical, radio, television, electronic and mechanical apparatus, etc. Directors: F. D. Forbes, M. D. Forbes and H. W. Eagle (secretary). Regd. office: 11, Whytecliffe Road, Purley, Surrey.

Elemech, Ltd.—Registered 20th March. Capital £2,500. To acquire the business of mechanical and electrical engineers carried on by W. Brass, J. Sutton and W. Hacking at The Garage, East Boldre, Brockenhurst, etc. Directors: W. Brass, J. Sutton and W. Hacking (secretary). Regd. office: 1, High Street, Lymington, Hants.

Liquidations

Landmar Electrical Engineering, Ltd., electrical contractors and radio and refrigeration engineers, New Foundry, Bridgend, Glam.—Winding up voluntarily. Liquidator, Mr. S. Price, Albion House, King Street, Gloucester, appointed by members on 27th March. Particulars of claims to the liquidator by 31st May. This notice is purely formal; all known creditors have been or will be paid in full.

Billingham (Electrical), Ltd., retailers of electrical goods, 152, Yarmingale Road, King's Heath, Birmingham.—Liquidator, Mr. W. L. Hand, Colmore House, 21, Waterloo Street, Birmingham, appointed by members and creditors on 29th March. Particulars of claims to the liquidator by 29th April.

Planet Electrical, Ltd., manufacturers and factors of electrical equipment, 27, Broad Oaks Road, Solihull, Warwickshire.—Winding up voluntarily. Liquidator, Mr. T. E. Tildesley, of the above address, appointed by members on 30th March.

H. C. Atkins Laboratories, Ltd., electronic instrument manufacturers, 139, Temple Chambers, Temple Avenue, London, E.C.4.—Liquidator, Mr. W. R. G. Weaver, of the above address, appointed by creditors on 29th March.

Overseas Electrical Supplies, Ltd., electrical engineers, Bucklersbury House, Bucklersbury, London, E.C.4.—Winding up voluntarily. Liquidator, Sir Harold Moore, Jacey House, Bournemouth, appointed by members on 10th April. Particulars of claims to the liquidator by 1st May.

Pool Electrics (Blackpool), Ltd.—Particulars of claims to the liquidator, Mr. J. L. Hague, Bank Chambers, 7, South King Street, Blackpool, by 29th April.

Sayers & Williams, Ltd., manufacturers of and dealers in radio, television and electrical appliances, 23, Peterborough Road, Harrow, Middx.—Liquidator, Mr. R. A. Hawken, Bank Chambers, 1, John Street, Bedford Row, London, W.C.1, appointed by creditors on 11th April.

Home & Domestic Services (Bristol), Ltd., electrical dealers and furnishers, 211, Gloucester Road, Bristol.—Winding up voluntarily. Liquidator, Mr. G. C. Ehlers, 28, Baldwin Street, Bristol, appointed by members and creditors on 29th March.

Capel Electrical & Radio Co., Ltd.—Meeting of members at 124, High Street, Dorking, Surrey, on 25th May to receive an account of the winding up from the liquidator, Mr. C. R. Watson.

Bankruptcies

C. Day (trading as C. Day & Sons), 60, Dean Road, Bitterne, Southampton, electrical dealer.—Receiving order made 5th April on a creditor's petition.. Public examination 21st June at the County Court, Castle Square, Southampton.

L. Treadgold, television, radio and electrical retailer, 198, King Street, Alfreton, Derbyshire.—Public examination 14th June at the Court House, 20, St. Peter's Church Yard, Derby.

D. Fenwick, lately carrying on business at 2a, Crowhall Lane, Felling, Durham, as a dealer in handicraft supplies under the style of Homecraft, and at 25, Chapel Street, Felling, as an electrical contractor and electrician under the style of Des Fenwick Electrics.—Public examination 23rd May at the Court House, 56, Westgate Road, Newcastle-upon-Tyne.

K. Ashmore, carrying on business at 939, Wakefield Road, Bradford, Yorks., as an electrical contractor and formerly carrying on business at the same address and at 80, Leeds Road, Windhill, Shipley, Yorks., and 370, Leeds Road, Bradford, under the style of R.S.M. Machines as a retailer of sewing machines.—Trustee, Mr. G. E. Rushton, 36, North Parade, Bradford, appointed 6th April.

G. Ford, lately carrying on business at 15, York House, Thorpe Edge, Bradford, Yorks., as an electrical retailer.—Trustee, Mr. R. W. Hellyer, Brotherton Chambers, Westgate, Leeds, appointed 6th April.

G. S. Douthwaite, carrying on business under the style of G. S. Douthwaite & Co., at 25, Dean Street, Newcastle-upon-Tyne, electrical engineer.—Last day for receiving proofs for dividend 25th April. Trustee, Mr. W. Armstrong, Clarendon House, Clayton Street West, Newcastle-upon-Tyne.

B. Harrison, trading with or formerly trading with another as retail electrical dealers at "Timbers," Smugglers Lane, Highcliffe, Hants.—Trustee, Mr. J. B. Montgomery, 142, Greenhill Road, Winchester, appointed 30th March.

W. D. Dutton, carrying on business as Tyne View Electrical Sales and Service at 34, Tyne View, Lemington, and 28, Wansbeck Road, Gosforth, Northumberland, electrical retailer.—Public examination 23rd May at the Court House, 56, Westgate Road, Newcastle-upon-Tyne.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1956

12606. General Electric Co., Ltd.—Electrical apparatus for providing a measure of the standing wave ratio in a high frequency electrical transmission means. 24th July, 1957. (864860.)

18797. Mullard Radio Valve Co., Ltd.—Semiconductor devices. 16th April, 1957. (865088.)

22119. Dobson, J. D.—Lighting fittings. 17th July, 1957. (865183.)

22384. Electric & Musical Industries, Ltd.—Servo mechanism. 12th July, 1957. (865090.)

22580. Telephone Manufacturing Co., Ltd.—Polarised electromagnetic relays. 18th October, 1957. (864892.)

31094. Benjamin Electric, Ltd., and Campbell, H. G.—Combined lighting and air conditioning systems. 4th October, 1957. (864894.)

1957

807. Wandleside Cable Works, Ltd., and Wray, W. L.—Electric heating cables. 8th January, 1958. (865055.)

1356. A.E.I.-Hotpoint, Ltd.—Electrically heated washing machines. 14th January, 1958. (864863.)

4430. Associated Electrical Industries, Ltd.—Electric signal transmission systems. 6th January, 1958. (865365.)

10042. Robertshaw-Fulton Controls Co.—Transmitter potentiometer. 27th March, 1957. (865142.)

12759. Toyo Tsushinki Kabushiki Kaisha.—Electromechanical filters. 18th April, 1957. (865093.)

14627. Benjamin Electric, Ltd., and Luxford, N. B.—Machines for agitating the contents of drums and other containers. 17th February, 1958. (865225.)

22672. Siemens-Schuckertwerke A.G.—Apparatus for regulating the speed of hydraulic or steam turbines. 17th July, 1957. (865143.)

22901. Sundstrand Corporation.—Automatic load control systems for parallel connected alternators. 19th July, 1957. (865357.)

23123. Sims, W. J.—Sheathed wire electric heating elements. 22nd July, 1958. (864954.)

23365. Gaunt, J. G. (Etablissements L. Hatot).—Small magneto-electric machines. 23rd July, 1957. (864899.)

23620. Weatherholt, D. D., Cherry, L. F., Fulford, J. H., Hooey, F. M., and Wright, R. G.—Hair dryer. 25th July, 1957. (865010.)

27073. United Kingdom Atomic Energy Authority.—Microwave supporting structures. 28th August, 1958. (865367.)

32328. Licentia Patent-Verwaltungs-G.m.b.H.—Apparatus for recording electrical or mechanical measurements. 16th October, 1957. (864922.)

34009. CKD. Modrany, Narodni Podnik.—Process for the production of selenium photo-electric cells. 31st October, 1957. (864931.)

34907. Associated Electrical Industries, Ltd.—Resonant circuit arrangements of variable bandwidth. 27th November, 1958. (865068.)

1958

483. General Electric Co., Ltd.—Nuclear reactor control rod materials. 29th December, 1958. (865226.)

2980. Graetz, E.—Arrangement for the magnetic deflection of the electron beam in cathode-ray tubes, particularly for television purposes. 29th January, 1958. (864945.)

3667. Siemens-Schuckertwerke A.G.—Processes for producing semiconductor devices. 4th February, 1958. (Addition to 846744.) (865370.)

6705. National Research Development Corporation.—Mercury switches and variable resistors. 2nd June, 1959. (864948.)

6822. Thompson & Co. (Sunbury), Ltd., R. E., Macandrew, J. F., and Stork, B.—Thermostatic electric control switches. 3rd March, 1959. (864949.)

7302. Associated Electrical Industries, Ltd.—Electrical pulse recurrence rate measurement. 12th March, 1959. (865075.)

7475. Associated Electrical Industries, Ltd.—Wire winding machines. 3rd March, 1959. (864989.)

7594. Brayhead (Ascot), Ltd.—Holders for electronic valves. 10th March, 1959. (864950.)

11674. United-Carr Fastener Corporation.—Electrical connectors. 11th April, 1958. (865228.)

11782. Pye, Ltd.—Transformer assemblies. 8th April, 1959. (864936.)

14301/2. Associated Electrical Industries, Ltd.—Thermionic valves. 28th April, 1959. (864938/9.)

14400. Standard Telephones & Cables, Ltd.—Phase adjustment arrangements. 6th May, 1958. (865076.)

15548. Marconi's Wireless Telegraph Co., Ltd.—Microwave attenuators. 28th November, 1958. (864940.)

18349. Allis-Chalmers Manufacturing Co.—Circuit-breaker control system. 9th June, 1958. (865154.)

19205. Formica International, Ltd.—Manufacture of materials for use in the production of printed circuits. 16th June, 1959. (864873.)

19832. Standard Telephones & Cables, Ltd.—Electrical supervisory equipment. 19th June, 1959. (865237.)

24541. Regie Nationale des Usines Renault.—Electromagnets. 30th July, 1958. (865238.)

25392. British Insulated Callender's Cables, Ltd.—Junction boxes for electric cables. 6th August, 1959. (865345.)

26815. Associated Electrical Industries, Ltd.—Preparation of platinum/carbon rods for electron microscope technique. 12th August, 1959. (865239.)

27057. Vyzkumny a Zkusebni Letecky Ustav.—Electromagnetic torsional transducer. 22nd August, 1958. (865051.)

27752. Graviner Manufacturing Co., Ltd., and Wilkinson Sword, Ltd.—Flexible electrical connectors. 25th August, 1959. (864910.)

31013. Robbins & Bradley, Ltd.—Electric light fittings. 9th December, 1959. (864913.)

31175. Marconi's Wireless Telegraph Co., Ltd.—Switch controlled circuit arrangements. 2nd June, 1959. (865242.)

31687. Associated Electrical Industries, Ltd.—Back-stop arrangements in devices having moving parts with restricted return movement. 30th September, 1959. (865018.)

33937. Westinghouse Electric Corporation.—Transformers. 23rd October, 1958. (865019.)

34570. Sneath, O. B.—Transistor circuits for pulse and surge production. 28th October, 1959. (864959.)

35104/5. General Electric Co., Ltd., and Snow, A.—Bandpass electric filters. 29th October, 1959. (865052/3.)

36490. Standard Telephones & Cables, Ltd.—Apparatus for winding filamentary materials. 13th November, 1958. (865022.)

37267. Charles Colston, Ltd.—Dish washing machines. 19th November, 1958. (864979.)

37347. Hart Manufacturing Co.—Electrical busbar. 20th November, 1958. (865023.)

38951. Pressac, Ltd.—Electric sockets for multi-pin plugs or the like. 12th October, 1959. (865244.)

39187/8. Associated Electrical Industries, Ltd.—Telephone handsets. 25th November, 1959. (864995/6.)

39667/8. Austinlite, Ltd.—Static invertor arrangements. 15th September, 1959. (864923/4.)

41009. Morris Electrical Engineering Co., Ltd., John.—A.c. generating machines. 11th November, 1959. (865279.)

1959

201. Tesla Narodni-Podnik.—Low frequency amplifier circuit. 2nd January, 1959. (864964.)

3402. Siemens-Schuckertwerke A.G.—Weatherproof housing for electric machines arranged to be cooled by induced ventilation means. 30th January, 1959. (865028.)

4963. Associated Electrical Industries, Ltd.—Manufacture of grid electrodes for electric discharge devices. 28th January, 1960. (865258.)

4967. Schlieker, W. H. (trading as Walzwerk Neviges W. H. Schlieker & Co.)—Arrangement for the non-destructive measurement of the iron losses of sheets of ferro-magnetic material. 12th February, 1959. (865030.)

7079. Square D Co.—Control circuits for use with high flux density transformers for resistance welders. 2nd March, 1959. (865079.) 7083. Electrical terminal connectors. 2nd March, 1959. (865281.)

8832. Contactor (Proprietary), Ltd.—Over-temperature heater element safety switch. 13th March, 1959. (864967.)

10990. United States Atomic Energy Commission.—Thermonuclear injection process and injector. 1st April, 1959. (865082.)

18052. Commissariat à l'Energie Atomique.—Girdles for nuclear reactor cores. 27th May, 1959. (865286.)

19380. Leeds & Northrup Co.—Negative feed-back amplifiers. 5th June, 1959. (865224.)

22424. Philips Electrical Industries, Ltd.—Detachable connecting means for cooling liquid and electric current. 30th June, 1959. (865170.)

23116. Marconi's Wireless Telegraph Co., Ltd.—Waveguide structures. 25th November, 1959. (865124.)

26695. Harvey Hubbell, Inc.—Electrical connector. 5th August, 1959. (865035.)

31408. Telefunken G.m.b.H.—D.c. amplifiers. 15th September, 1959. (865125.)

42418. Western Electric Co., Inc.—Communication systems. 14th December, 1959. (865354.)

42941. Philips Electrical Industries, Ltd.—Electric discharge tubes. 17th December, 1959. (865054.)

1960

540. Industriele Onderneming W. H. Braskamp N.V.—Electric heating apparatus. 6th January, 1960. (865041.)

5032. Sundstrand Corporation.—Control means for a multiple generator load division system. 19th July, 1957. (Divided out of 865357.) (865358.)

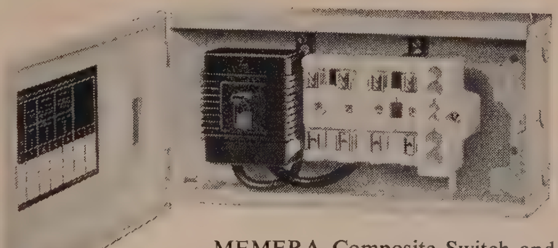
27134/6. United-Carr Fastener Corporation.—Electrical two-part connectors. 11th April, 1958. (Divided out of 865228.) (865229/31.)

MEM

FOR BASILDON NEW TOWN IN ESSEX

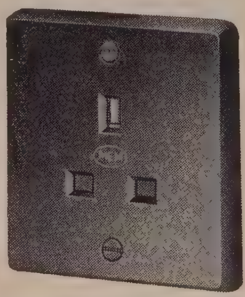
This aerial view shows the Lee Chapel area of the Basildon new town housing scheme, where MEM switch and fuse units and 13 amp. socket outlets were used exclusively. The extensive nature of this contract reflects the increasing use of MEM switchgear and accessories on the country's major housing projects.

The architects for this development were Messrs. Burles and Newton, and Messrs. Seymour Harris and Partners, in association with Mr. Anthony B. Davies, Chief Architect/Planner, Basildon Development Corporation. The electrical contractors were Messrs. Holliday, Hall and Stinson Limited.



MEMERA Composite Switch and Fuse unit with metalclad case. 4, 6 or 8 ways allowing any combination of 5, 15, 20 or 30 amp. fuses. Rewirable or H.R.C. cartridge fuse carriers.

MEM 13 amp. 3 pin socket outlet to B.S. 1363 with extra safe shutter design, moulded in brown or ivory.



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On every count, AEROFLEX Fuse-Links transcend BS requirements and rigorous tests prove their performance to be without equal. In direct-on started motor circuits they can withstand surges *up to 6 or 7 times* full load current, without any increase of resistance or change of time/current characteristic! Suitable for both industrial and flameproof applications, interchangeable with all leading makes, AEROFLEX give the surest protection against overloading. The energy permitted to develop in a faulty circuit is only a minute fraction of that admitted by conventional automatic protection, and the severest faults are disconnected noiselessly and instantaneously. You can *safely* say AEROFLEX—the Fuse-Links for performances in a class of their own.

Note! When blown. Aeroflex fuses can be returned to our works for rewiring.

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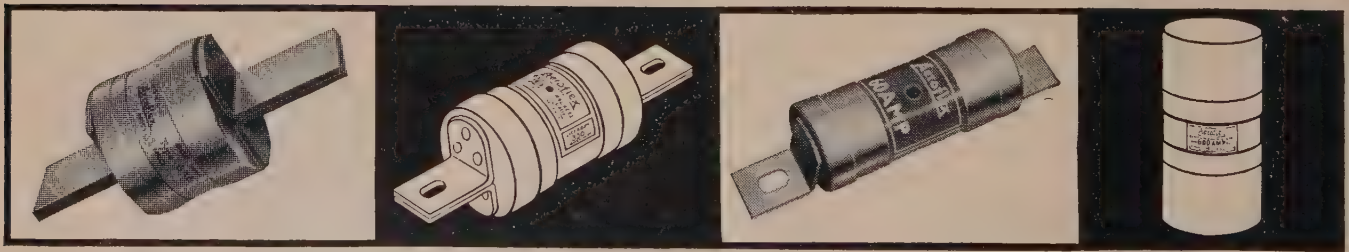

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PH 192

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Altrincham.—Borough Council. 4th May. Installation of 118 lighting units. (See this issue.)

Argentina.—Water and Electric Power Board. 20th July. Transformers and separators. (E.S.B. 12471/61.)*

Burton Latimer.—U.D.C. 15th May. Trunk road lighting. (See this issue.)

Costa Rica.—National Electricity Institute. 3rd July. Two 500 kW diesel generators. (E.S.B. 12110/61.)*

Egypt.—Suez Canal Authority. 1st May. Cables and wires. (E.S.B. 11808/61.)*

Eston.—U.D.C. 2nd May. Group "A" lighting, South Bank. (See this issue.)

Formosa.—Central Trust of China. 4th May. Switchgear. (E.S.B. 12458/61/I.C.A.)*

Greece.—Ministry of Trade. 2nd May. Cables. (E.S.B. 11821/61.)*

State Railways. 5th May. Electric hand-lamps. (E.S.B. 11802/61.)*

Hebburn (Durham).—U.D.C. 9th May. Electrical installations in 24 flats and 24 maisonnettes. R. C. Bestow, surveyor.

India.—India Supply Mission, Washington, D.C. 12th June. 138 kV circuit-breakers for Chandrapura power station. (See this issue.)

Chittaranjan Locomotive Works. 16th May. Substation equipment. (E.S.B. 11500/61.)*

Rihand Electricity Department. 15th June. Transmission line. (E.S.B. 12115/61.)*

Iraq.—Ports Administration. 7th May. 500 9 cu ft refrigerators. (E.S.B. 12174/61.)* 14th May. 250 house service meters. (E.S.B. 12175/61.)*

Ministry of Defence. 24th May. Radio equipment. (E.S.B. 10485/61.)*

Italy.—N.A.T.O. Infrastructure Contract. Telephone network and overhead line connections. Applications to tender by 25th April. (G.D. 5685/58(105).)†

Korea.—Government Office of Supply. 13th May. Telephone cable. (E.S.B. 12821/61/I.C.A.)* 15th May. Cable and winches. (E.S.B. 12822/61/I.C.A.)*

Kuwait.—Government Development Board. 1st May. Airfield mechanical services and electrical installation. (E.S.B. 12859/61.)*

Department of Electricity. 3rd May. Cartridge fuse links. (E.S.B. 12858/61.)*

Longbenton.—U.D.C. Rewiring of 59 prewar houses at Seaton Burn. (See this issue.)

Malaya.—Central Electricity Board. 24th May. Pipework, tanks, pumps and ancillary plant for Johore Bahru power station. (See this issue.)

Malta.—Government of Malta. 18th May. Transformers (Contract No. 1027/14) and cables, cable boxes and accessories (Contract No. 1027/15). (See this issue.)

Margate.—Borough Council. 29th April. Electrical installations in houses and flats, Millmead Road estate. Borough engineer, 38, Grosvenor Place.

New Zealand.—State Electricity Department. 20th June. Cable. (E.S.B. 12803/61.)*

Northern Ireland.—4th May. Electrical installation at proposed Ballymurphy Primary School. City Architect's Department, 40, Academy Street, Belfast.

Norwich.—Corporation. Improved street lighting; contractors are invited to submit their names to the city engineer. (See this issue.)

Pakistan.—Directorate of Supply, Dacca. 4th May. Signalling equipment. (E.S.B. 12171/61.)*

Directorate of Posts and Telegraphs. 10th May. Power station equipment. (E.S.B. 12164/61.)*

Thailand.—Royal Irrigation Department. 8th June. Circuit-breakers, disconnecting switches, etc. (E.S.B. 12846/61.)*

United States.—Bureau of Reclamation. 1st May. Transformers and switchgear. (E.S.B. 12817-8/61.)*

Uruguay.—Administracion General de las Usinas Electricas y los Telefonos del Estado. 5th September. Installation of a radio link. (E.S.B. 12838/61.)*

ORDERS PLACED

Bradford.—Corporation. Rewiring work at the Town Hall (£27,827).—T. W. Broadbent.

Northumberland.—Education Committee. Electrical installation, Forest Hall Secondary School (£3,711).—F. W. Johnson & Sons.

Shipley.—U.D.C. Recommended. Electrical installation work at the Market Hall (£5,053).—W. D. Wilson & Son (Bradford).

South Shields.—Corporation. Electrical installation in Whiteleas Junior Mixed School (£3,617).—Gee & Brown.

Stockport.—Corporation. Electrical installation work at Victoria Park (£7,193).—Piggott & Whitefield.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Barnes.—Rebuilding Sheen County School for Boys, Barn Elms Park; county architect, County Hall, Kingston-on-Thames.

Bedford.—Six-storey office block; F. W. Dawkes, architect, Newnham House, Horne Lane.

Bradford.—Tong Secondary School; J. G. L. Poulson, architect, 29, Ropergate, Pontefract.

Flats (20), site adjoining Haworth Road housing estate; W. Clifford Brown, city architect.

Brighton.—Seven-storey building, Queen's Road and Windsor Street; National Deposit Approved Friendly Society, 32, Queen's Road, Brighton.

Caernarvon.—Works and offices; Ferodo, Ltd., Chapel-en-le-Frith, Stockport, Ches.

Chanctonbury (Sussex).—Houses (48), West Chiltington and Sullington; surveyor, Council Offices, Storrington, Sussex.

Chatham.—Old people's flats (25), Wayfield estate, and 218 houses, Ordnance Street redevelopment; borough engineer, Town Hall.

Cranborne.—Secondary modern school; F. C. Denley & Partners, surveyors, 45, Commercial Road, Parkstone.

Crewe.—Eleven-storey flats, Moat House Farm estate; borough engineer.

Crook (Co. Durham).—Fruit packing factory, Whitfield Street; Dixon & Close, National Bank Chambers, Crook, Co. Durham.

Darlington.—Shops, Duke Street, for W. Duncan, Ltd.; C. Solomon, architect, 30, St. Mary's Place, Newcastle-on-Tyne.

Dartford.—Administration block including main building, canteen, workshops, stores and garages, Dartford Tunnel project; Mott, Hay & Anderson, consulting engineers, 9, Iddesleigh House, Caxton Street, London, S.W.1.

Doncaster.—Phase 4 of new Technical College; borough surveyor.

Dorchester.—Flats (42), Mill Street; borough engineer, Guildhall Chambers.

Dudley.—Two halls of residence and teaching block, Teachers' Training College (£366,348); borough architect, 5, Ednam Road.

Edgware.—Office block, Station Road; Morgan & Branch, architects, 8, Great New Street, London, E.C.4.

Enfield.—Dwellings (50), Hoe Lane; borough engineer.

Ennerdale.—Houses (100), Yeathouse Road area, Frizington; surveyor, Council Chambers, Cleator.

Fareham.—Infants' school, Fareham Park (Phase 1); county architect, Winchester.

Fylde.—Council offices; R.D.C. surveyor, Station Road, Kirkham, Lancs.

Gateshead.—Supermarket, Durham Road, for Laws Stores, Ltd.; Mauchlen, Weightman & Elphick, architects, 12, Saville Row, Newcastle-on-Tyne.

Glasgow.—Factory extension; Textile Engineering Co., Ltd., Rutherglen Road.

Office block, Sighthill; Railway Architects' Department, 32, Elmbank Crescent.

Redevelopment of Anderston Cross area; Architects' Department, Municipal Buildings, George Square.

Grimsby.—Flats, East Marsh area (£575,000); borough surveyor.

Hanley.—Office block, Civic Centre site; J. R. Piggott, city architect, Kingsway, Stoke-on-Trent.

Hungerford.—Secondary modern school; county architect, Reading.

Kilburn.—Flats, High Road (£300,000); Emberton, Franck & Tardrew, architects, Chantrey House, Eccleston Street, S.W.1.

Leicester.—Civic theatre; Chamberlin, Powell & Son, architects, Sydney Mews, London, S.W.3.

Second phase of extensions to Colleges of Art and Technology; city architect.

Lincoln.—Y.M.C.A. hostel; Watkins, Coombes & Partners, architects, 191, High Street.

London.—New building and adaptations, Furzedown Training College (£571,900); L. Manasseh & Partners, architects, 39, Bedford Street, London, W.C.2.

Lowestoft.—Works and offices; J. L. Kier & Co., Ltd., 7, Lygon Place, London, S.W.1.

Ludlow.—Houses (104), Sheet Road estate; borough engineer, Dinham Lodge, Ludlow, Salop.

Mallaig (Inverness).—Quick-freezing factory; A. Fairley, secretary to the Herring Industry Board, 1, Glenfinlas Street, Edinburgh.

Newbury.—Houses (106), Turnpike Road estate; borough surveyor, Municipal Buildings.

(*Continued on next page*

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* This information is extracted from the Board of Trade *Export Service Bulletin*. Inquiries should be addressed to the Board of Trade, Export Services Branch, Lacon House, Theobald's Road, London, W.C.2 (Telephone: Chancery 4411, Ext. 738), quoting the reference given. †Telephone: Trafalgar 8855, Ext. 2010.

CONTRACT INFORMATION (*continued*)

Northants.—Schools at Sywell and Woodford; county architect, County Offices, Guildhall Road, Northampton.

Pendlebury.—Twin operating theatre suite and admission unit, Royal Manchester Children's Hospital; Manchester Regional Hospital Board, Cheetwood Road, Manchester, 8.

Peterborough.—Houses (124), Welland Road, Dogsthorpe; L. H. Robjohn, city surveyor.

Reading.—Houses (123), Bulmershe estate, and 48 one-bedroomed flats; borough architect, Town Hall.

Smethwick.—Factory, Oldbury Road; United Spring Co., Ltd., Hawthorne Street.

Southampton. — Hightown Secondary School; borough architect, Civic Centre.

Standish (Lancs.).—C. of E. school (£34,000); F. Bradley, architect, 4, Wood Street, Bolton.

Stockport.—15-storey flats, shops, etc., Mottram Street redevelopment area, and multi-storey flats, Dodge Hill House area; J. Rank, borough architect.

Taunton.—New wing, County Hall; Goodwin & Tatum, architects, 6, Bedford Row, London, W.C.1.

Thornbury.—Dwellings (52), Almondsbury and Alveston; Rainger, Rogers & Smithson, architects, Wellington Square, Cheltenham.

Tipton.—Redevelopment of Owen Street shopping area; borough engineer, Municipal Buildings, Sedgley Road West, Tipton, Staffs.

Twickenham.—Showrooms and offices for Phelps, Ltd., Heath Road; Howard Farrow, Ltd., Highfield Road, London, N.W.11.

Wednesbury.—Block of classrooms at Staffs. College of Commerce, Wood Green Road (£150,000); county architect, County Buildings, Stafford.

West Molesey.—Factory and offices, Island Farm Industrial Estate; Roberts Radio Co., Ltd., Creek Road, East Molesey, Surrey.

Whitley Bay.—Supermarket, West Monkseaton; Mauchlen, Weightman & Elphick, architects, 12, Saville Row, Newcastle-on-Tyne.

Wilton.—Works reconstruction; Wilton Royal Carpet Factory, Ltd., North Street.

Wortley.—Nine blocks of flats at Oughtibridge; Arthur Wikeley, engineer, Council Offices, Grenoside, Sheffield.

Wycombe.—Old persons' dwellings (46), Longwick Road, Princes Risborough; R.D.C. surveyor, 17, High Street, High Wycombe.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 12th May.

JAJ (design). No. 813,768. Class 9. Scientific and electrical apparatus, etc.—James A. Jobling & Co., Ltd., Wear Glass Works, Alfred Street, Millfield, Sunderland, County Durham.

Dritan. No. 815,508. Class 9. Electrical capacitors.—Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, London, W.3.

Regosil. No. 815,961. Class 9. Apparatus for rectifying alternating electric currents.—Associated Electrical Industries, Ltd., 33, Grosvenor Place, London, S.W.1.

Aster. No. 801,569. Class 11. Lighting fittings. No. 802,481. Class 11. Electric lamps including lamps for producing light flashes, and holders and sockets.—Thorn Electrical Industries, Ltd., Thorn House, Upper St. Martins Lane, London, W.C.2.

Ventamatic. No. 814,922. Class 11. Ventilating fans.—R. W. Simon, Ltd., System House, 64-66, Millman Street, London, W.C.1.

Toaster-matic. No. 815,660. Class 11. Electric toasters.—John Kelly & Sons (Kitchen Engineers), Ltd., 17, Castle Street, Edinburgh.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 243a, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

MONDAY, 24th APRIL

Birmingham.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Centre, Electronics and Measurement Group Meeting. Annual general meeting followed by "A Review of Progress in Ultrasonic Inspection Techniques," by A. C. Rankin.

Ipswich.—Electric House, 6.30 p.m. I.E.E. East Anglian Sub-Centre. "A Basis for Short-Circuit Ratings for Paper-Insulated Cables up to 11 kV," by L. Gosland and R. G. Parr.

Leeds.—Houldsworth School of Applied Science, Leeds University, 7.30 p.m. Institution of Plant Engineers, West and East Yorkshire Branch. "The Introduction of Planned Maintenance Systems," by A. F. Stedman.

London.—Institution Building, Savoy Place, W.C.2, 6.30 p.m. I.E.E. London Graduate and Student Section. "Development of City Distribution Systems," by G. W. Green.

Rugeley.—Lea Hall Colliery. I.E.S. Birmingham Centre. "Colliery Electrification with particular reference to Mine and Washery Lighting," by G. W. Hall, combined with a visit to the surface installations.

TUESDAY, 25th APRIL

Cardiff.—South Wales Engineers' Institute, Park Place, 7.30 p.m. Institution of Plant Engineers, South Wales Branch. "Fuel Efficiency," by W. Short.

Leeds.—College of Technology, Calverley Street, 6.30 p.m. I.E.E. North Midland Centre, Education Discussion Circle. Discussion on "Refresher and Post-Graduate Courses for Electrical Engineers," to be opened by P. L. Taylor.

London.—Memorial Building, 76, Mark Lane, E.C.3, 5.30 p.m. Institute of Marine Engineers. Presidential address by Viscount Simon, C.M.G., followed by annual general meeting.

Park Lane Hotel, Piccadilly, W.1. Institution of Chemical Engineers, London Branch. Annual general meeting and annual dinner and dance.

Manson House, 26, Portland Place, W.1, 6.30 for 7 p.m. Society of Instrument Technology. "Instrumentation in the Iron and Steel Industry," by A. H. Pople.

Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurement and Control Section. "Simulation of Intelligence," by Prof. D. M. Mackay.

Manchester.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North Western Centre Supply Group. "An Electrostatic Dust Monitor," by D. H. Grindell.

WEDNESDAY, 26th APRIL

Birmingham.—College of Advanced Technology, 6.30 p.m. I.E.E. South Midland Graduate and Student Section. Annual general meeting.

Hatfield.—Technical College, 7 p.m. I.E.E. Hatfield District. "Railway Electrification in Great Britain," by D. H. McCracken.

Leicester.—Midland Hotel, 7.30 p.m. Institution of Plant Engineers, Leicester Branch. "Mechanical Handling," by N. A. L. Thorne.

London.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Electronics and Communications Section. "Data Transmission," by R. H. Franklin and J. Rhodes.

School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, 6 p.m. British Institution of Radio Engineers. Symposium on "Electronic Counting Techniques."

1, Birdcage Walk, Westminster, S.W.1, 6 p.m. Institution of Mechanical Engineers. Annual report of the Council.

Pillar Hall, Olympia, 4.15 p.m. Institution of Production Engineers. 1960 George Bray Memorial Lecture. "The Protective Treatment of Metals against Corrosion," by H. Silman.

John Adam Street, Adelphi, W.C.2, 2.30 p.m. Royal Society of Arts. Trueman Wood Lecture. "The Training of Scientists and Engineers for Industry," by Sir John Cockcroft.

Northampton.—Northampton and District Electrical Association. Annual general meeting.

WEDNESDAY, 26th to FRIDAY, 28th APRIL

London.—Central Hall, Westminster. British Institute of Radiology. Exhibition of equipment and materials used in medical radiology and radiotherapy.

THURSDAY, 27th APRIL

Birmingham.—Engineering Centre, 7 p.m. Institute of Marine Engineers, West Midlands Section. "The History and Development of Air and Gas Compressing Plants," by M. J. Waldon.

Chester.—The Blossoms, 7.15 p.m. Institution of Plant Engineers, Merseyside and North Wales Branch. "Problems Associated with the Running of a General Engineering Works," by C. J. Wright.

Lincoln.—Ruston Club, 7.30 p.m. Institution of Production Engineers, North Midlands Region. "Some Aspects of Production Engineering," by L. R. Mumford.

London.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Kelvin Lecture. "Medical Electronics," by Prof. R. F. Woolmer.

Connaught Rooms, W.C.2, 12.30 for 1 p.m. Batti-Wallahs' Society. Luncheon.

London Fire Brigade Headquarters, Albert Embankment. A.S.E.E. South London Branch. Combined visit and lecture on "Modern Fire Risks."

1, Birdcage Walk, Westminster, S.W.1, 6 p.m. Institution of Mechanical Engineers, Steam Plant Group. Discussion on "Acid Cleaning as Applied to Steam Power Plant."

Wirral.—Associated Ethyl Co., Ltd., Oil Sites Road, Ellesmere Port, 7 p.m. Society of Instrument Technology, Chester Section. Annual general meeting followed by film show.

FRIDAY, 28th APRIL

Birmingham.—College of Advanced Technology, 6 p.m. I.E.E. South Midland Centre Education Discussion Circle. Discussion on "The Selection of Engineering Students," to be opened by W. D. Furneaux.

Leeds.—Great Northern Hotel, Wellington Street, 7 p.m. I.E.E. North Midland Graduate and Student Section. Annual general meeting.

Manchester.—Reynolds Hall, College of Science and Technology, Sackville Street, 7 p.m. Institution of Electronics, Manchester Branch. "Techniques for Digital Data Links," by F. G. Heath.

Newcastle-upon-Tyne.—Grey Hall, King's College, 6.30 p.m. I.E.E. North Eastern Graduate and Student Section. Annual general meeting.

SATURDAY, 29th APRIL

Harwell.—I.E.E. Supply Section. Visit.

London.—London Fire Brigade, Albert Embankment, 2.30 p.m. I.E.E. London Graduate and Student Section. Visit.

SATURDAY, 29th APRIL to TUESDAY, 2nd MAY

Eastbourne.—Queen's Hotel. Association of Electrical Machinery Trades. Annual convention.

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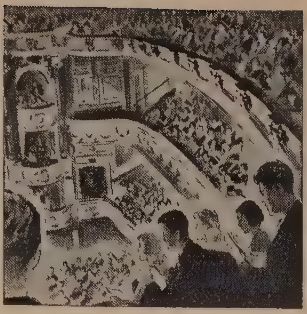

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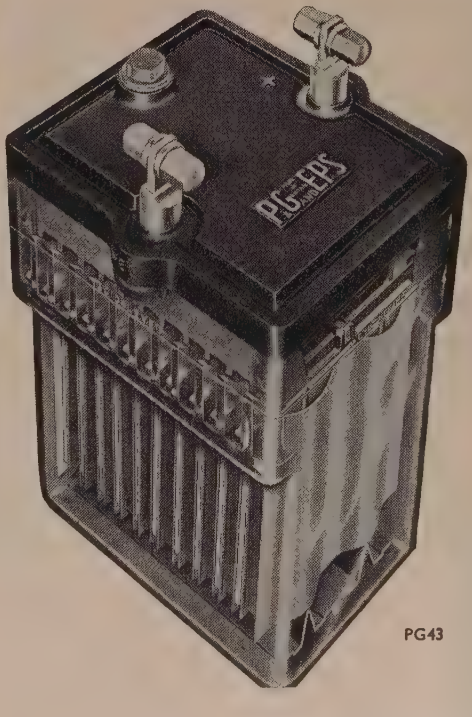

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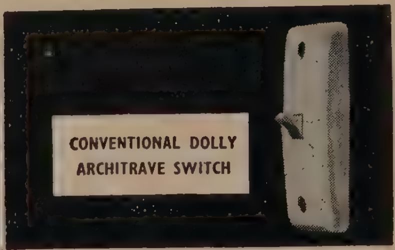

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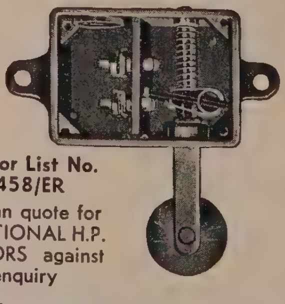

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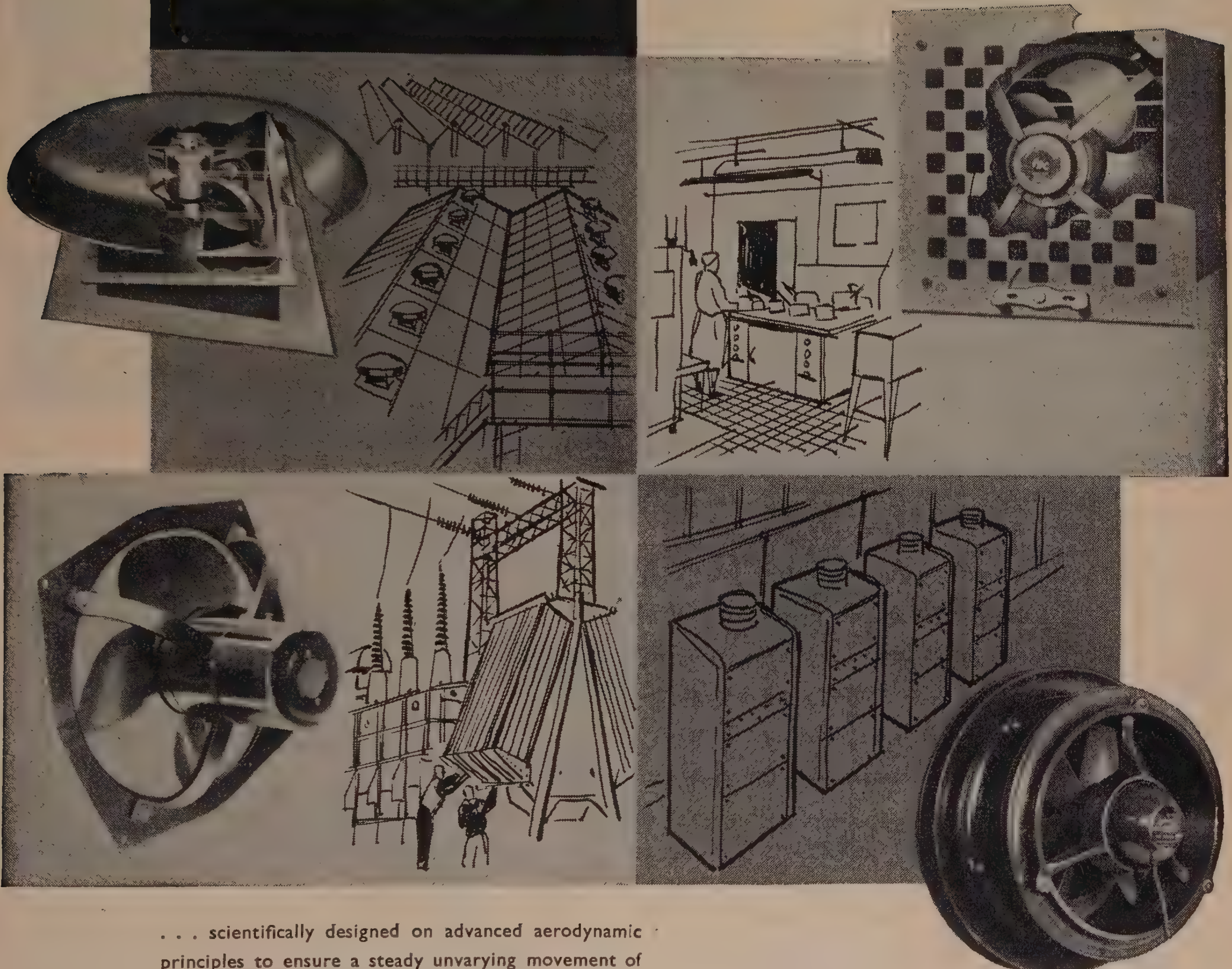

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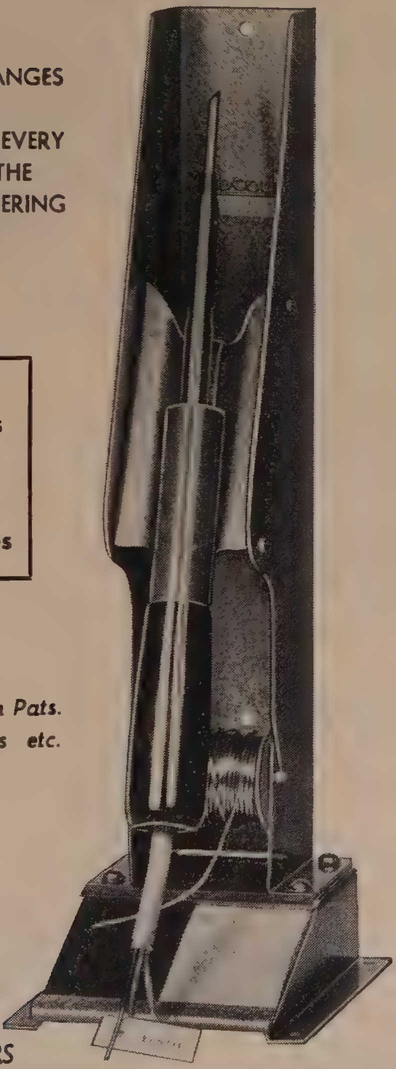

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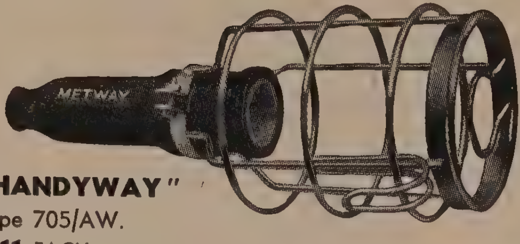

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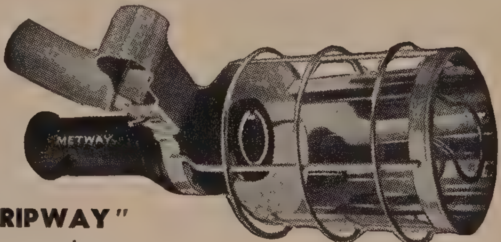

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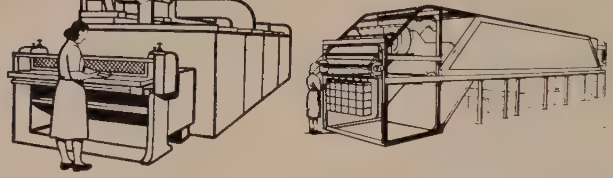

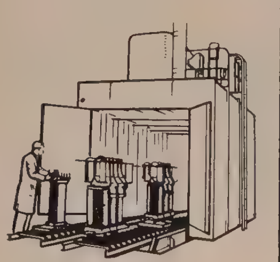

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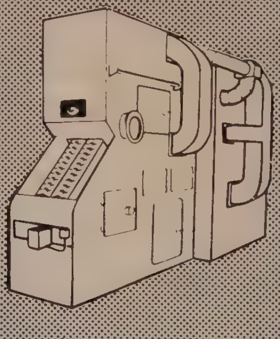

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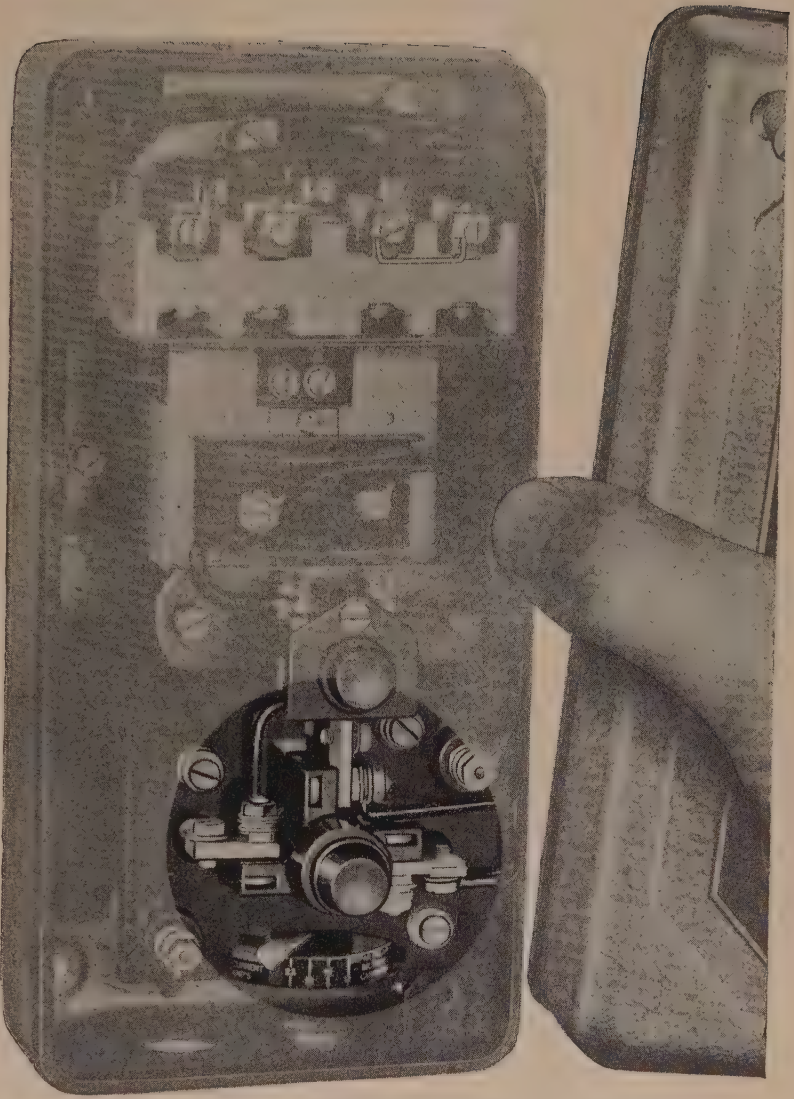

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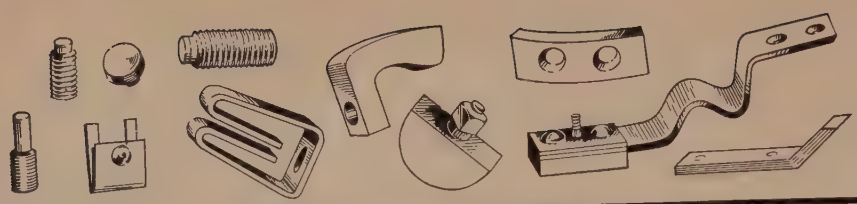

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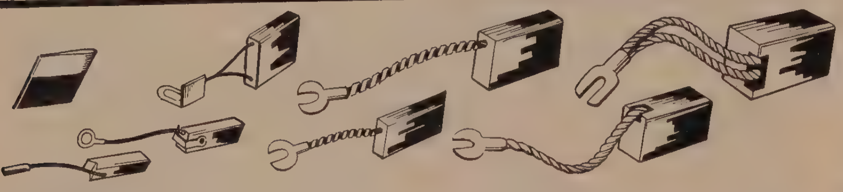

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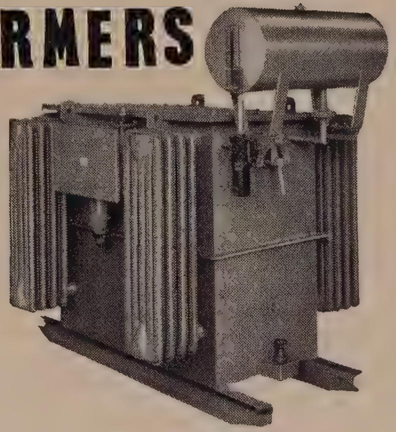

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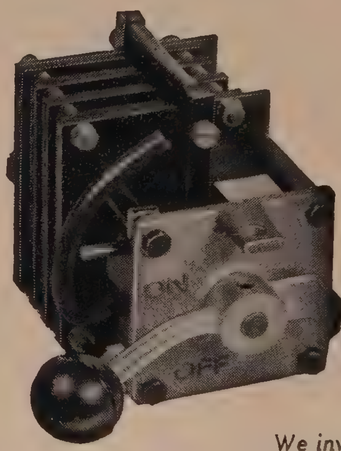

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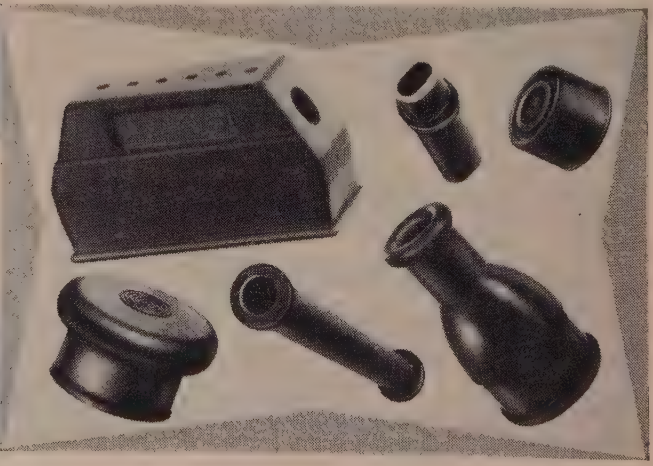

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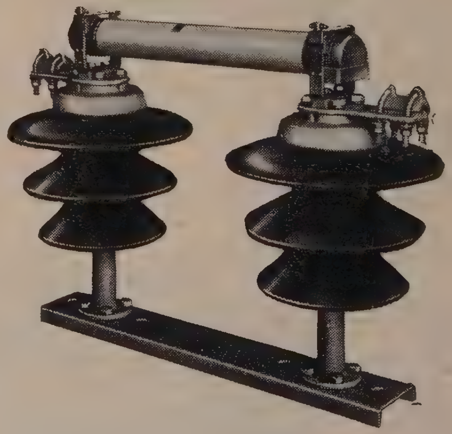

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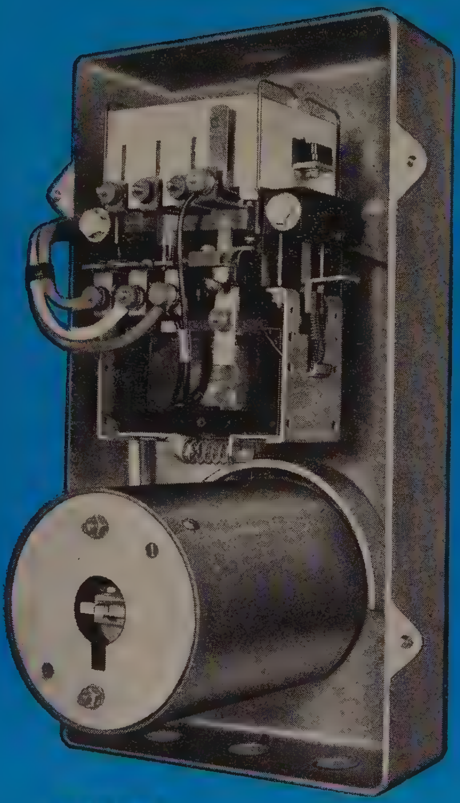

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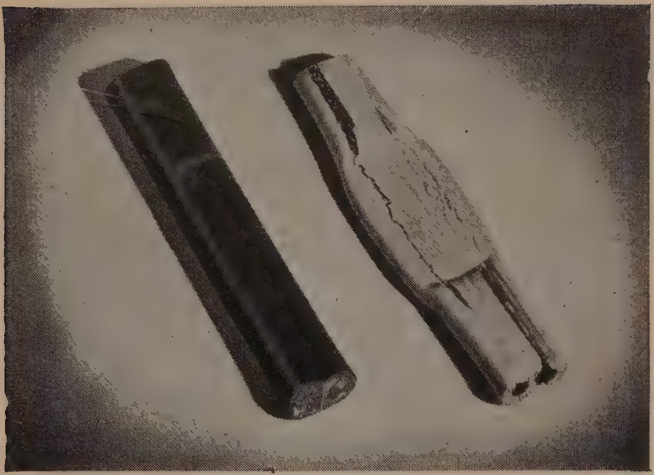
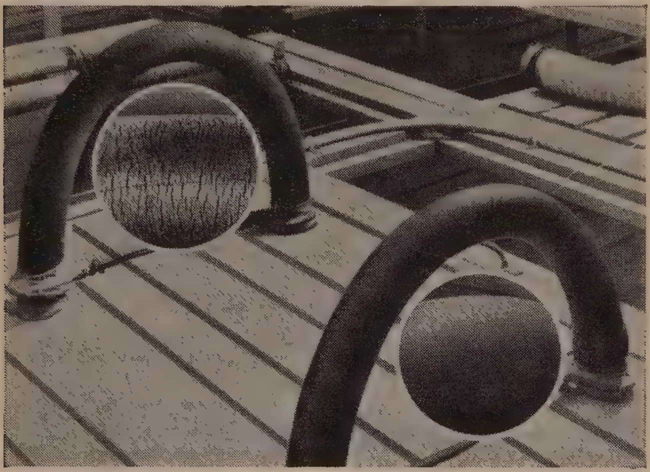


No plastic flow with neoprene. It is vulcanized, does not revert and flow. Neoprene sample (left) compressed 8 hours at 75 psi at 302°F. was practically unaffected. Thermoplastic sample breaks down under test.



Weather resistance with neoprene. Neoprene cable jacketing (right) remains lively and tough after continuous exposure to sun and weather since 1935. Natural rubber jacket is badly deteriorated.

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Du Pont neoprene's reputation as jacketing for wire and cable has been earned by over twenty years of tough and varied service. Its outstanding performance is based on a combination of properties unequalled by any other jacketing material. Du Pont neoprene offers balanced resistance to all the causes of deterioration —weather, sunlight, ageing and wide temperature variations; flame and ozone; oil and grease; many organic and inorganic chemicals; soil acids and galvanic action . . . as well as severe impact, abrasion and cutting.

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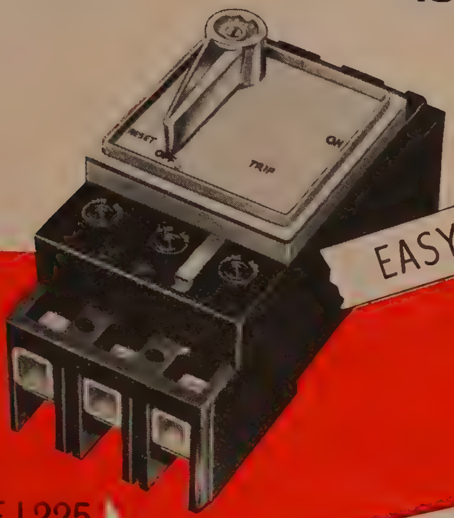

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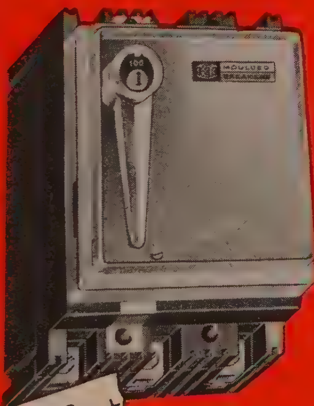

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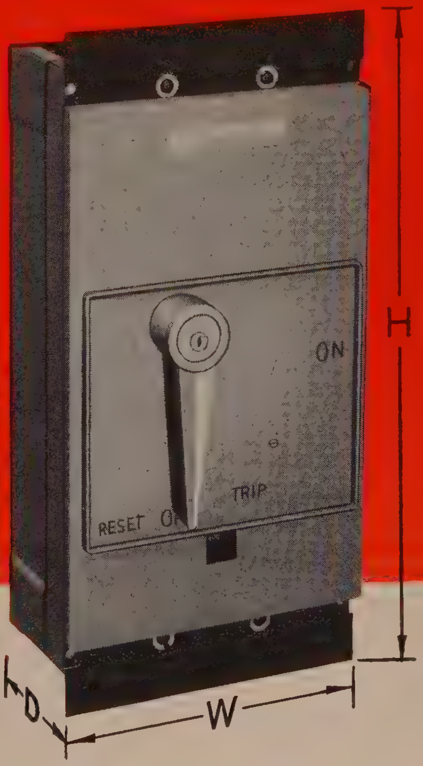

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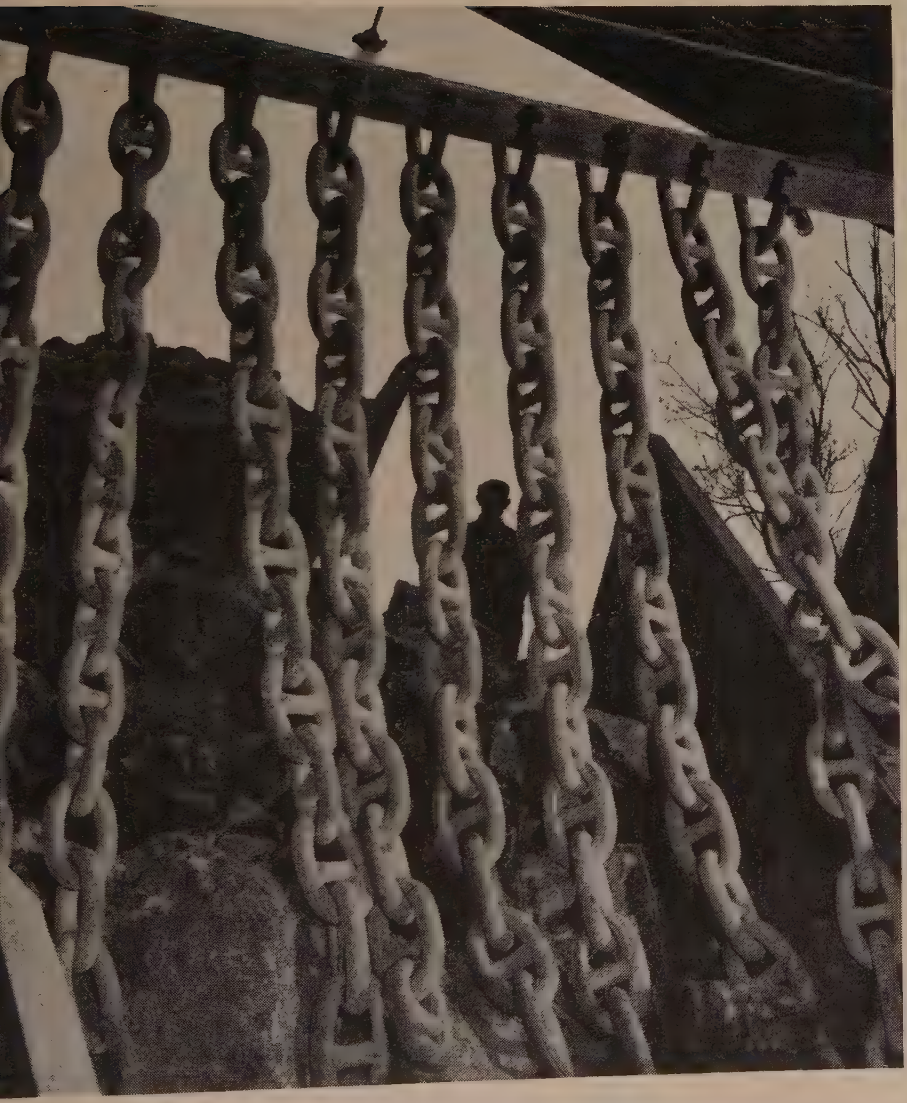

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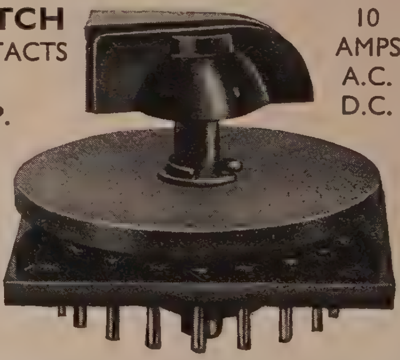

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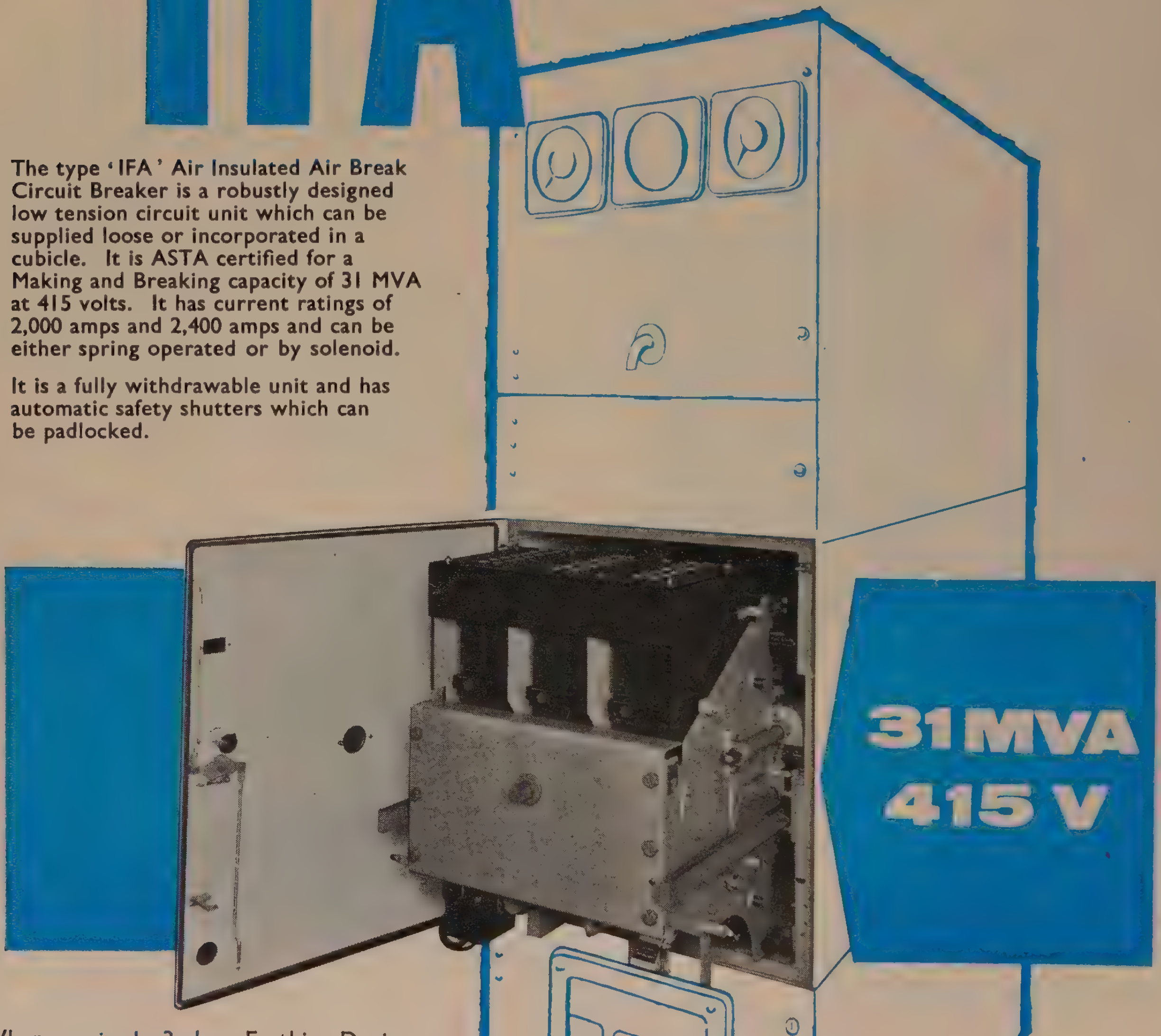

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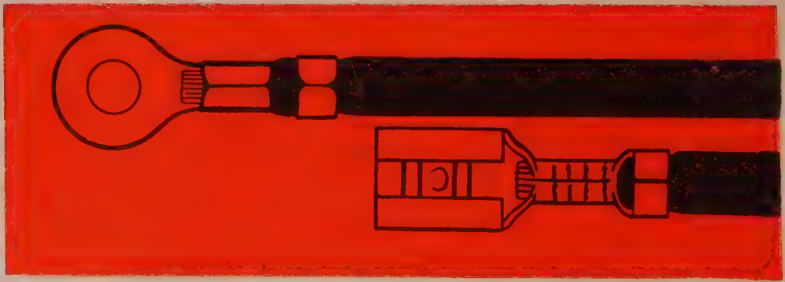

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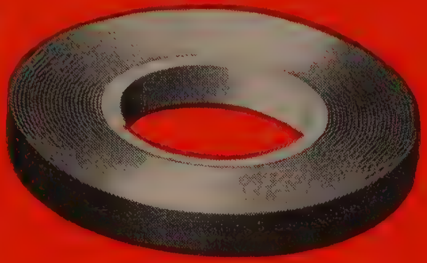

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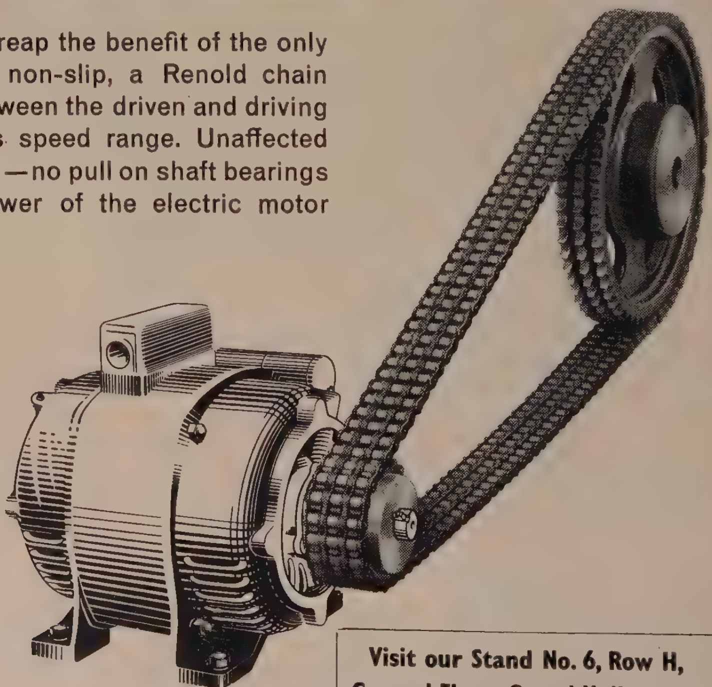

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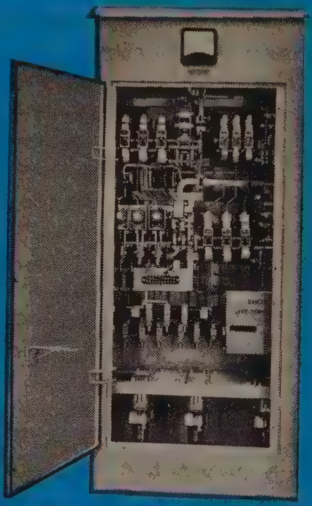

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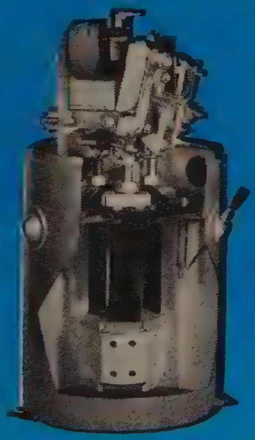

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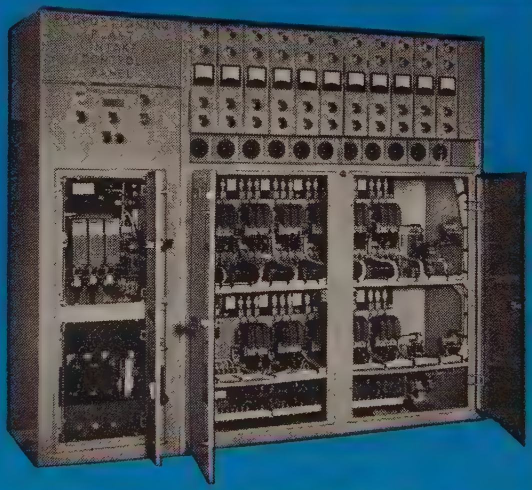

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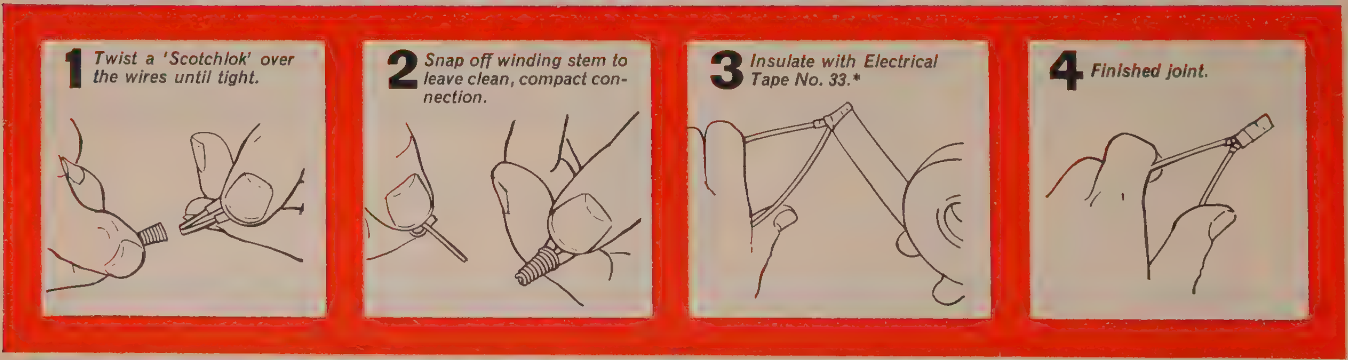

1 Twist a 'Scotchlok' over the wires until tight.

2 Snap off winding stem to leave clean, compact connection.

3 Insulate with Electrical Tape No. 33.*

4 Finished joint.

* **'Scotch' Brand Electrical Tape No. 33** will effectively insulate any electrical joint with 'wrap-around' security of up to *9500 volts per layer*. It will not harden, become brittle or lose its grip under the most extreme conditions —torture tests prove it.

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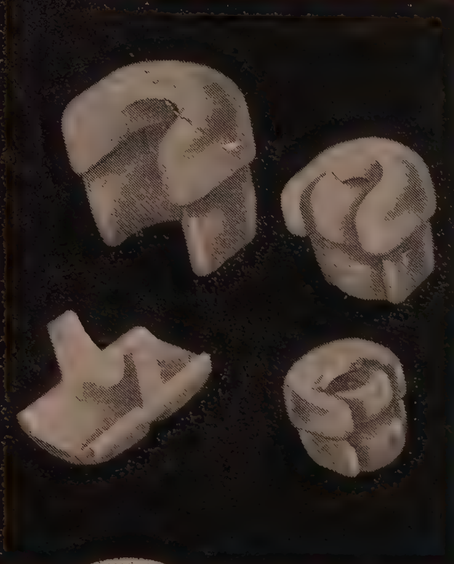

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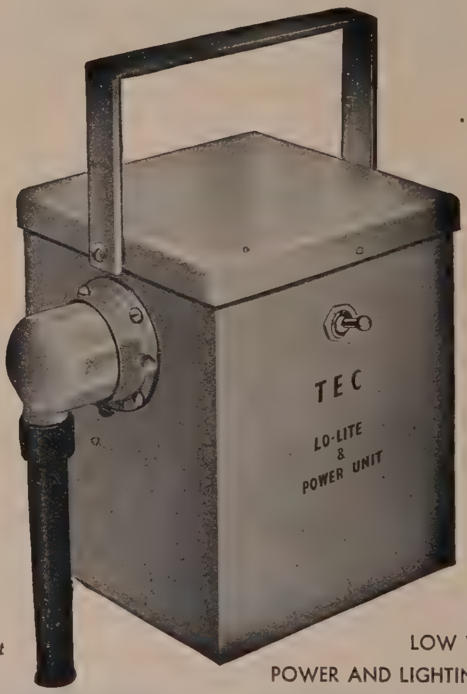

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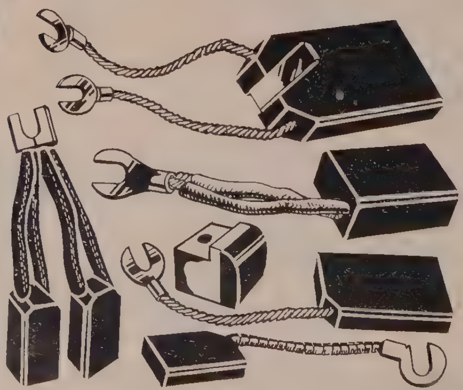

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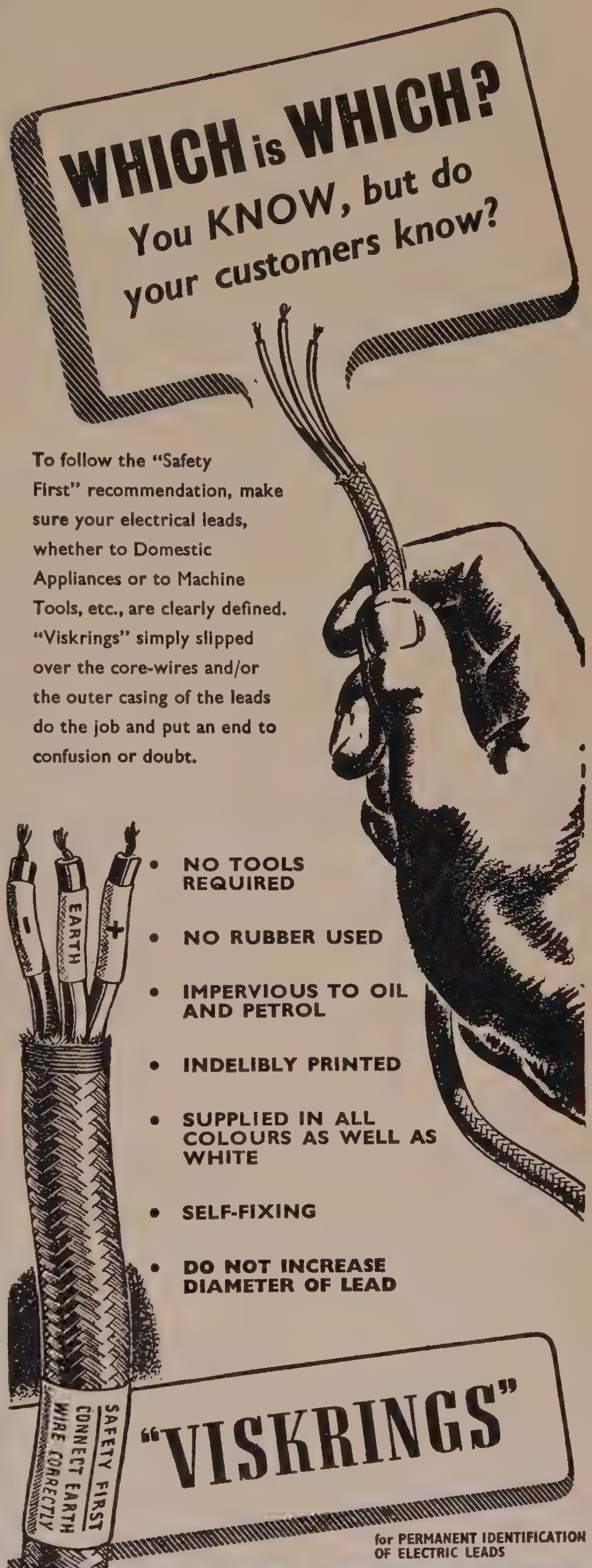

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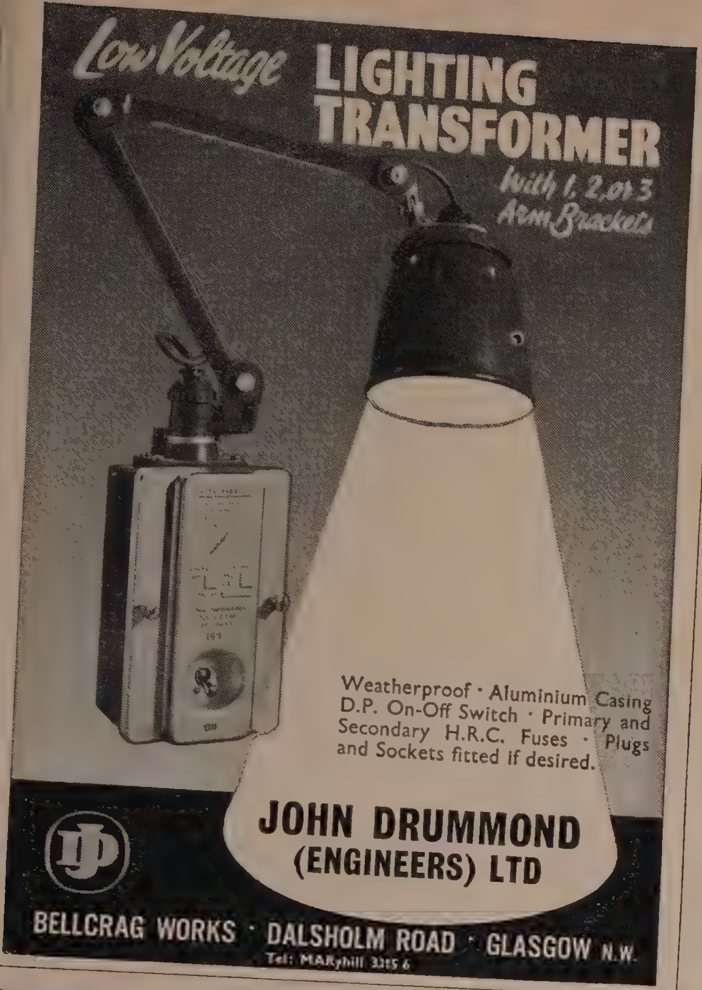

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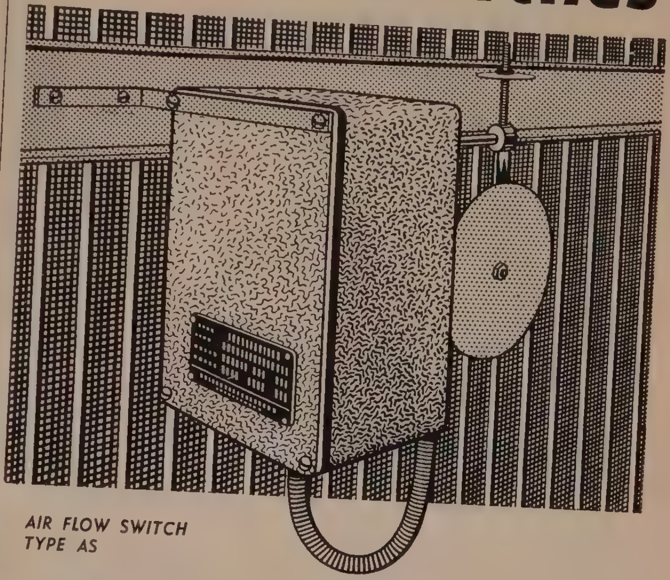
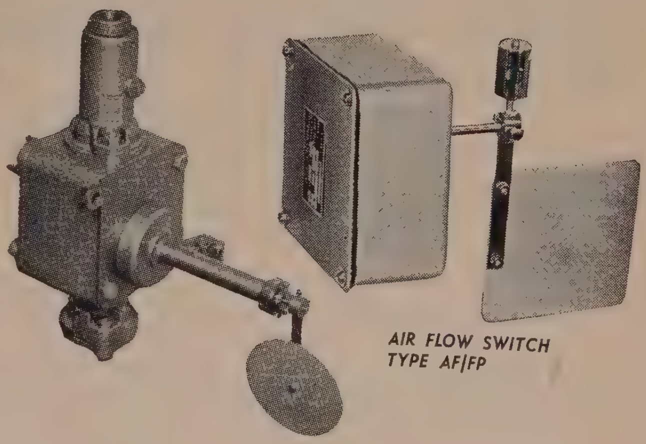


*AIR FLOW SWITCH
TYPE AS*



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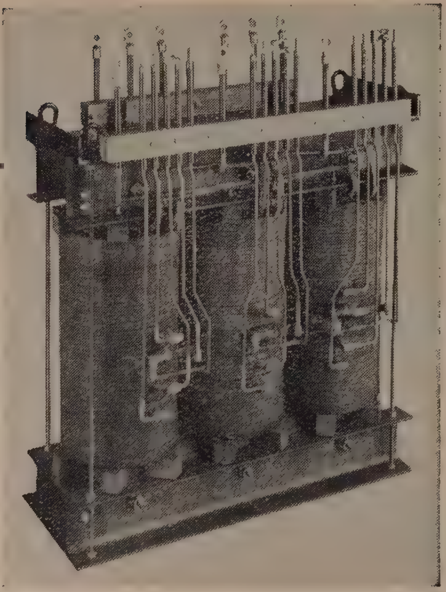

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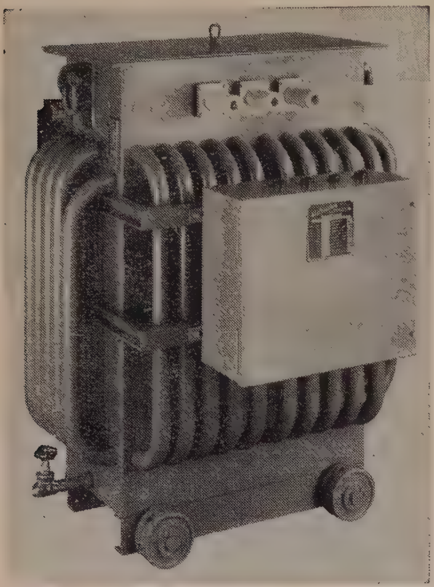

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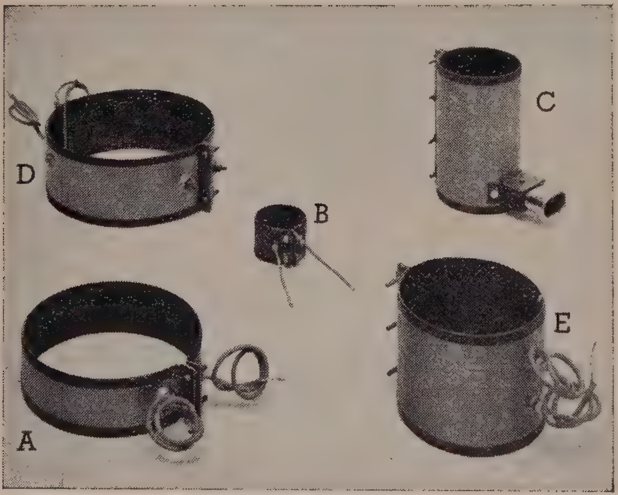

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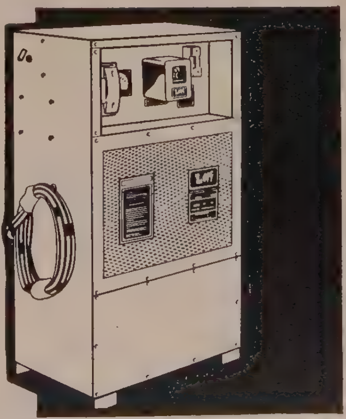

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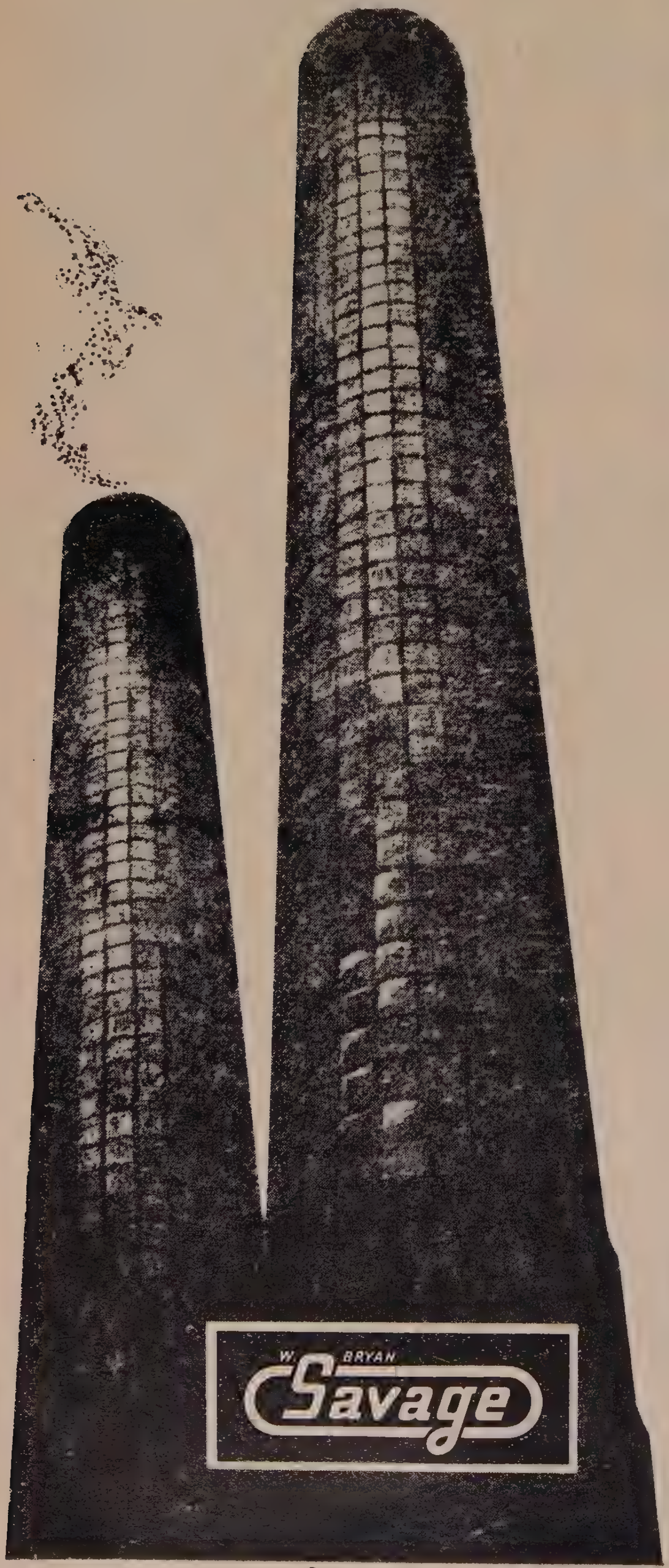

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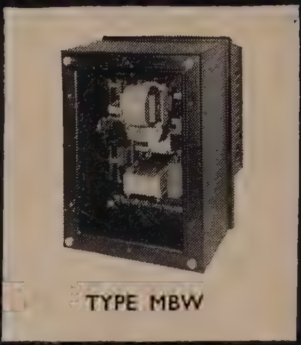

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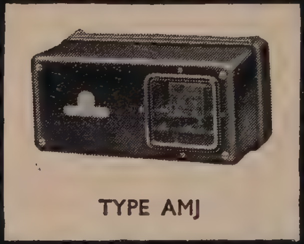

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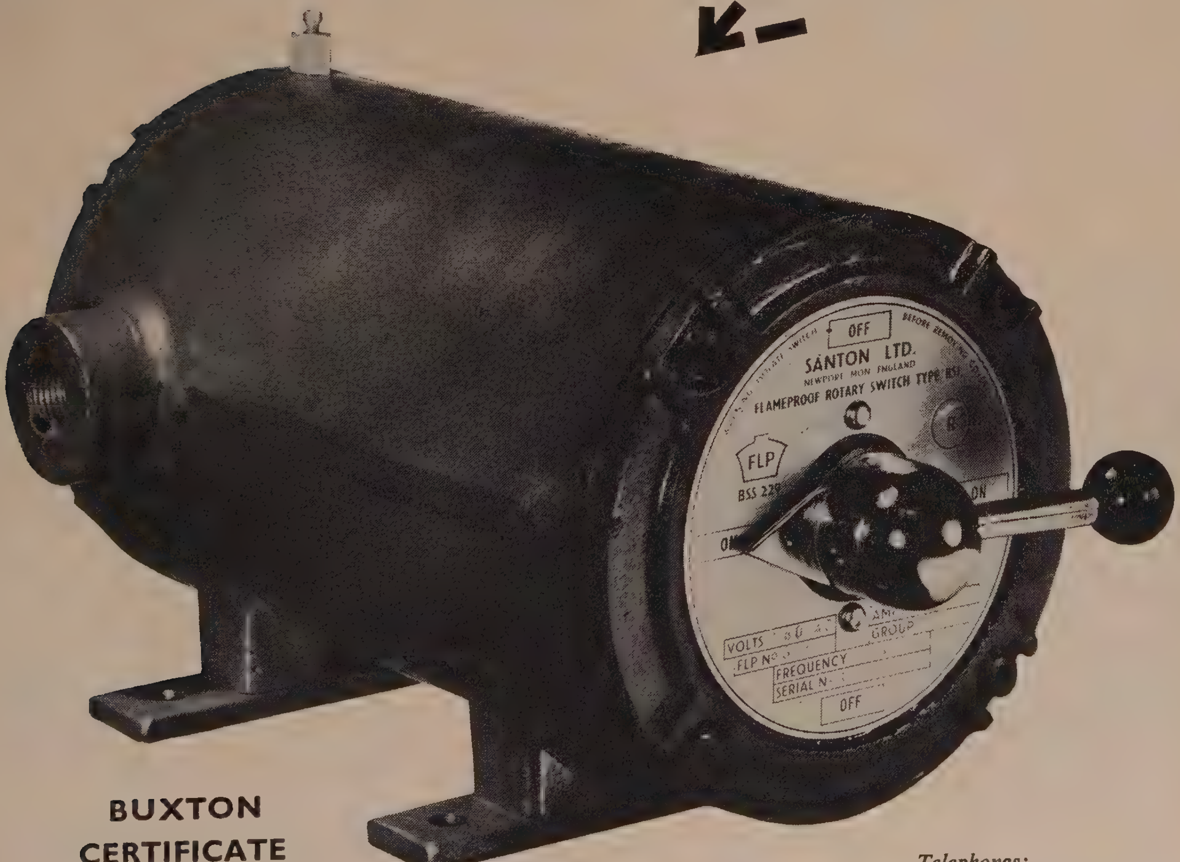

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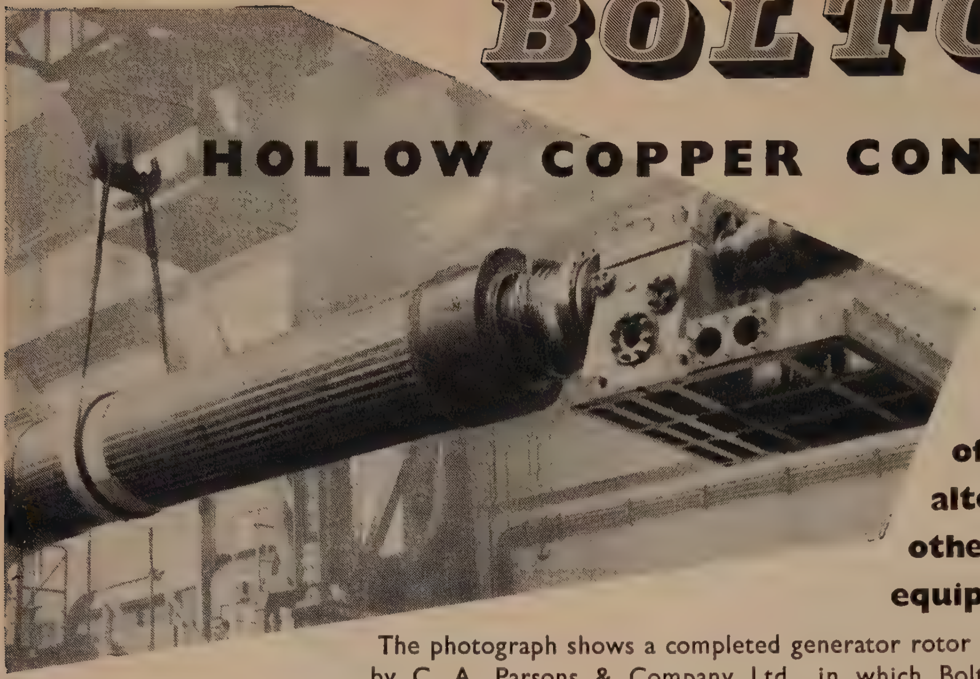

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Photograph by courtesy of C. A. Parsons & Co. Ltd.

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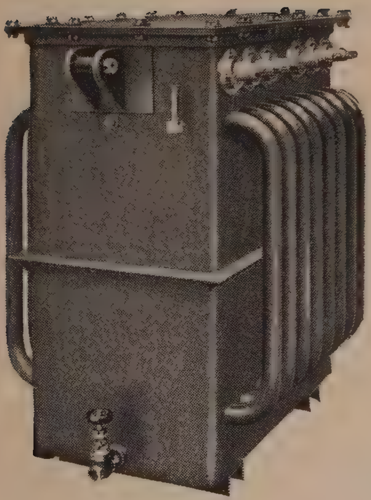

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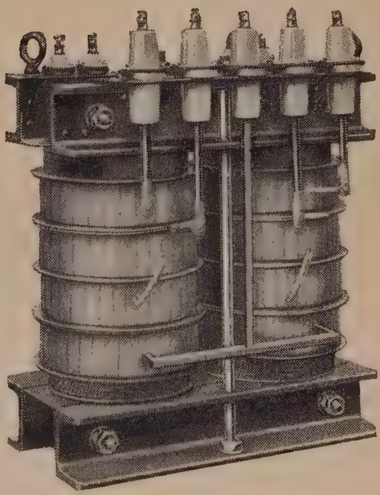

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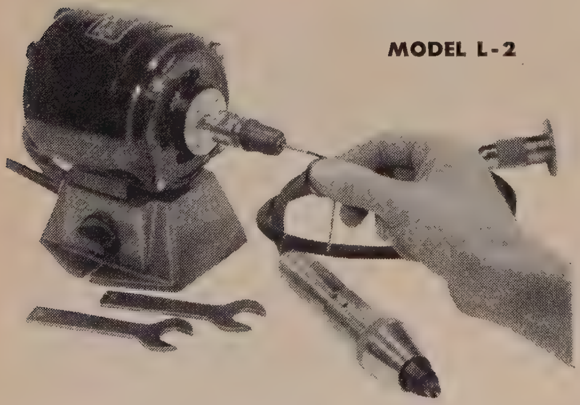

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Contract No. 1027/14

Advertisement No. 180/61

TENDERS are invited by the Government of Malta for the supply and delivery at Malta, freight and insurance paid, of 2 5,000-kVA, 11,500/6,900-volt Transformers.

Copies of the specification, drawings, form of tender and conditions of contract may be obtained from the Office of the Accountant General and Director of Contracts, The Treasury, The Palace, Valletta, Malta, or from the Crown Agents for Oversea Governments and Administrations, 4, Millbank, London, S.W.1, by application on payment of £2 for each set of the documents (3 copies), quoting reference Contract 1027/14, Advertisement No. 180/61, if applying to the Malta Government, and Requisition W6/EE1/Malta 4840 if applying to the Crown Agents.

Completed and sealed tenders in duplicate in a plain envelope, and bearing the appropriate references, must be delivered at the Office of the Accountant General and Director of Contracts, The Treasury, The Palace, Valletta, Malta, not later than 10 a.m. on 18th May, 1961.

The Government of Malta does not undertake to accept the lowest or any tender and will not defray any expenses incurred by the contractor in tendering. 693

URBAN DISTRICT COUNCIL OF ESTON

Group "A" Lighting: Trunk Road, South Bank

TENDERS are invited for the supply and erection of 49 Street Lighting Units at Trunk Road (A.1085), South Bank. The general conditions of contract, drawings and form of tender may be obtained from the Engineer and Surveyor, Town Hall, Fabian Road, South Bank, Middlesbrough, on payment of a deposit of £2, which will be refunded on receipt of a bona fide tender (not subsequently withdrawn) or the return of all the documents before the closing date for the receipt of tenders.

Tenders, in plain sealed envelopes, endorsed "Trunk Road Lighting," must be received by me not later than noon on Tuesday, the 2nd May, 1961.

The Council do not bind themselves to accept the lowest or any tender.

T. MYRDDIN BAKER,
Clerk of the Council.
Council Offices,
Grangetown-on-Tees. 709

BURTON LATIMER URBAN DISTRICT COUNCIL

Street Lighting

TENDERS are invited for the installation of Class "A" Lighting on the trunk road at Burton Latimer consisting of the provision and erection of twenty-eight Steel Columns together with twenty-eight Mercury Vapour Lanterns.

Specification and bills of quantities may be obtained from the Council's Surveyor, and the layout plan may be seen at his office.

Tenders to be submitted to me, in plain sealed envelopes marked "Class 'A' Lighting," by noon on Monday, 15th May, 1961.

C. E. LANSOM,
Clerk to the Council.
Council Offices,
Burton Latimer. 690

GOVERNMENT OF MALTA

Cables, Cable Boxes and Accessories

Contract No. 1027/15

Advertisement No. 181/61

TENDERS are invited by the Government of Malta for the supply and delivery at Malta, freight and insurance paid, of 11,000-volt Cables, Cable Boxes and Accessories.

Copies of the specification, form of tender and conditions of contract may be obtained from the Office of the Accountant General and Director of Contracts, The Treasury, The Palace, Valletta, Malta, or from the Crown Agents for Oversea Governments and Administrations, 4, Millbank, London, S.W.1, by application on payment of £2 for each set of the documents (3 copies), quoting reference Contract 1027/15, Advertisement No. 181/61, if applying to the Malta Government, and Requisition W6/EE1/Malta 4841 if applying to the Crown Agents.

Completed and sealed tenders in duplicate in a plain envelope, and bearing the appropriate references, must be delivered at the Office of the Accountant General and Director of Contracts, The Treasury, The Palace, Valletta, Malta, not later than 10 a.m. on 18th May, 1961.

The Government of Malta does not undertake to accept the lowest or any tender and will not defray any expenses incurred by the contractor in tendering. 692

INDIA SUPPLY MISSION

THE Office of the India Supply Mission, 2536, Massachusetts Avenue, N.W., Washington, 8, D.C., United States of America, invites tenders for the following:—

TENDER ENQUIRY No. SE.364.
For the supply of 138-kV Circuit Breakers for Chandrapura Thermal Power Station, required by Damodar Valley Corporation, India.

Specification, etc., relative to the above tender enquiry can be obtained from the Co-ordination Branch, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, at a cost of £1 1s. 5d. per tender. The cost of the tender document is not refundable and the forms are not transferable. Tenders are to be returned direct to India Supply Mission, 2536, Massachusetts Avenue, N.W., Washington, 8, D.C., United States of America, AND NOT TO THIS OFFICE, so as to reach them by 12th June, 1961.

Specimen copy of the above enquiry can be seen at India Store Department, Engineering Branch, Bromyard Avenue, Acton, London, W.3, under the reference S.4099/60/NSC/ENG.2. 672

CITY AND COUNTY OF NORWICH

Improvement of Street Lighting on Traffic routes for the year ending 31st March, 1962

STREET lighting schemes are to be carried out in the city on Prince of Wales Road, The Avenues, Bowthorpe Road, Dereham Road, Heigham Street, Ipswich Road, Newmarket Road and Westwick Street.

Contractors who are competent to carry out supply and erection of street lighting equipment and electrical installation works, and who wish to submit tenders for the various contracts which will be required throughout the year, are invited to submit their names to the City Engineer, City Hall, Norwich, NOR 01A. 756

CENTRAL ELECTRICITY BOARD OF THE FEDERATION OF MALAYA

Johore Bahru Power Station

Pipework, Tanks, Pumps and Ancillary Plant (Contract EE.1737/3)

TENDERS are invited for the supply and installation of the Pipework, Tanks, Pumps and ancillary plant associated with the boiler and turbo-alternator plant now under construction for the Federation of Malaya Central Electricity Board's new power station at Johore Bahru.

Tenders are invited only from firms who are prepared to submit complete tenders.

A short précis of the extent of the work and general conditions pertaining may be obtained on application to the Crown Agents for Oversea Governments and Administration, 4, Millbank, Westminster, London, S.W.1. Applications should quote Ref. Contract EE.1737/3.

Tender documents, which will be available from 19th April, 1961, and returnable by 1 p.m. on the 24th May, 1961, may be obtained from the Crown Agents on receipt of a payment by cheque for £10, to be made in favour of the Crown Agents for Oversea Governments and Administrations. This payment will not be refunded.

The Central Electricity Board do not bind themselves to accept the lowest or any tender, nor will they be responsible for any costs incurred by tenderers in preparing their tender. 733

BOROUGH OF ALTRINCHAM

Street Lighting

TENDERS are invited for the INSTALLATION of

118 LIGHTING UNITS

within the Borough. The contract includes the supply, wiring and putting into service of 60-watt and 85-watt Sodium Lamps, Lanterns and Gear, and the supply and erection of 20-ft. Concrete Columns.

Tender documents can be obtained from, and plan inspected at, the office of the Borough Surveyor, Town Hall, Altrincham, upon payment of a deposit of £5, made payable to the Borough Treasurer. The deposit will be refunded on receipt of a bona fide tender not subsequently withdrawn.

Tenders must be returned to the Town Clerk, Town Hall, Altrincham, in a plain sealed envelope, endorsed "Street Lighting," not later than Thursday, 4th May, 1961. The Council does not bind itself to accept the lowest or any tender.

E. GRAHAM THOMAS,
Town Clerk.
Town Hall,
Altrincham. 691

CLASSIFIED ADVERTISEMENTS ARE PREPAID

***Official Notices** (continued)*

LONGBENTON URBAN DISTRICT COUNCIL

Re-wiring of 59 Pre-war Houses at Seaton Burn

THE Council will shortly consider tenders for the above electrical work and interested contractors may now make application in writing to Mr. A. E. Sweetman, M.I.Mun.E., Engineer and Surveyor, Council Offices, Forest Hall, Newcastle upon Tyne, 12, for specification and bills of quantity to be issued when ready.

Applications for documents, accompanied by a deposit of £2 2s., returnable on submission of a bona fide tender not subsequently withdrawn, together with the return of documents, should be made immediately.

G. HARRISON,
Clerk of the Council.

Council Offices,
Forest Hall,
Newcastle, 12.

732

SITUATIONS VACANT

(See "Replies to Box Numbers" on page 107)

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following permanent superannuable posts in the DIVISIONAL ELECTRICAL DEPARTMENT (Cockfosters, North London):—

SECOND ASSISTANT ENGINEER (Civil) (S.V. No. 1485).

Salary range £1,435-£1,670 per annum (inclusive of London weighting).

The duties will include the design of civil engineering and building work associated with the construction of Grid substations, supervision of site exploration and survey work, programming of civil works drawings and the preparation of tender documents.

Applicants should have technical qualifications equivalent to Corporate Membership of the Institution of Civil Engineers, and must have had experience in the construction of Grid substations.

QUANTITY SURVEYOR (Third Assistant Engineer) (S.V. No. 1486).

Salary range £1,335 - £1,550 per annum (inclusive of London weighting).

The duties will include taking-off and the complete preparation of the bills of quantities for civil engineering and building work associated with the construction of Grid substations, examination of tenders, interim valuations and final accounts.

Applicants must be qualified and have had experience in this type of work.

SURVEYOR (Fourth Assistant Engineer) (S.V. No. 1487).

Salary range £905-£1,140 per annum (inclusive of London weighting).

The duties will include site survey work and levelling associated with the construction of Grid substations and overhead lines, setting out, site measurements and general assistance to the Quantity Surveyor.

Applicants should possess H.N.C. or its equivalent and must have had experience in this type of work and in the use and maintenance of surveying instruments.

Applications, quoting the appropriate reference S.V. No., stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 29th April, 1961. 716

G.W.B.

CONTROL GEAR DIVISION
require
ELECTRICAL ENGINEERS
experienced in automatic control gear.

Apply, in confidence, giving full details of experience to:—

Divisional Manager
G. W. B. FURNACES LIMITED
(Control Gear Division)
Dibdale Works, Lower Gornal, Dudley, Worcs.

679

IMPERIAL CHEMICAL INDUSTRIES LIMITED

GENERAL CHEMICALS DIVISION

Vacancies for Electrical Engineers in

POWER DEPARTMENT

The Division is one of the largest private users of steam and electrical energy in this country and its activities in these fields cover a wide range in a number of areas. They include, on a very extensive scale, Industrial Power Stations with steam conditions up to 1,600 psi.g. and 1,050°F, High Voltage Electrical Distribution Systems up to 33 kV, Static Substations, AC/DC Converter Substations, DC Distribution Systems, Works Medium Voltage AC Distribution Systems, Works Electrical Equipment, Steam Distribution Systems and Lancashire and Economic Boilers. The Division undertakes design, installation, operation and maintenance in connection with all these activities.

Vacancies exist for engineers between the ages of 25 and 30 to assist in all sections of the Department's activities and opportunities for obtaining a wide experience are exceptionally good,

Applicants should possess a good degree or Diploma in Technology, preferably in Heavy Current Electrical Engineering, and should have completed a post graduate apprenticeship.

There are excellent conditions of service and prospects, including a Pension Fund; there is also a Profit-Sharing Scheme, and for married men assistance is given towards removal expenses and legal charges incurred in house purchase.

Applicants should write, quoting reference EE69 to:—

STAFF MANAGER
IMPERIAL CHEMICAL INDUSTRIES LIMITED
GENERAL CHEMICALS DIVISION
CUNARD BUILDING, LIVERPOOL, 3

717

BOCM

THE BRITISH OIL AND CAKE MILLS LTD.

AN ELECTRICAL ENGINEER

IS REQUIRED FOR OUR FACTORY AT

SELBY, YORKSHIRE

The factory comprises an oilseed expelling mill, solvent extraction plant, oil refinery, and a large animal feeding-stuffs mill.

Extensive use is made of the most up-to-date electrical techniques, including remote and automatic controls. The plant is served from eight substations with a total transformer capacity of 13,550 kVA.

Applicants must be Corporate Members of the Institution of Electrical Engineers and have had adequate experience in the field of electrical engineering as applied in process industries. Candidates should preferably be in the age range 30-40.

Applications, giving age, qualifications and experience should be addressed to:

BRITISH OIL AND CAKE MILLS LTD. (AFP.T/437)
UNILEVER HOUSE, BLACKFRIARS, LONDON, E.C.4

600

PATENT EXAMINERS AND PATENT OFFICERS

PENSIONABLE posts for men or women for work on the examination of Patent applications. Age at least 21 and under 29 (36 for Examiners) on 31.12.61, with extension for regular Forces service and Overseas Civil Service. Qualifications: normally a Degree, or a Diploma in Technology, with first or second class honours in physics, chemistry, engineering or mathematics, or equivalent attainment, or professional qualification, e.g., A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., A.R.I.C., A.Inst.P.

Inner London salary £793 to £1,719; provision for starting pay above minimum. Promotion prospects.

Write Civil Service Commission, 17, North Audley Street, London, W.1, for application form, quoting **S/128/61** and stating date of birth. 720

SALES ENGINEER

WHIPP & BOURNE Ltd., of Castleton, near Rochdale, require two outside Sales Engineers, one to work from Castleton, the other to work from Glasgow.

The men appointed will be between the ages of 28 and 40, with a sound technical background in the heavy electrical field, preferably of H.T. and L.T. switchgear late A.C. and D.C.

Initial salary will be by negotiation; there are the usual expense allowances and a company car is provided. The usual conditions of service apply and there is a pension scheme in operation.

Applications giving details of qualifications and experience should be sent to F. E. Whipp, Esq., Messrs. Whipp & Bourne Ltd., Switchgear Works, Castleton, near Rochdale, Lancs., stating which of the two vacancies is preferred.

698

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the undernoted superannuable positions in the Development Section of the Chief Commercial Officer's Department at Board Head Office :—

(1) SENIOR ASSISTANT ENGINEER (Ref. C3/61).

Applicants should have had wide experience in the designing of industrial electrical equipments, and have a broad knowledge of their applications and economics. The duties will include advising consumers on the best modern practices of electricity utilisation in industry, investigation and analysis of industrial processes, research into and development of new or improved methods for utilising electricity in industry, and general load development activities.

Corporate Membership of the Institutions of Mechanical and/or Electrical Engineers is desirable, or qualifications giving exemption from the examinations of these institutions.

Salary N.J.B. Class BX, Grade 3, £1,570/£1,950 per annum.

(2) ASSISTANT ENGINEER (Ref. C4/61).

Applicants should have had experience in the designing of industrial process plant and equipment. Duties will include mechanical design work and co-operating with electrical engineers in advising consumers on the application and economics of electrical powered plant and processes.

Possession of Engineering Degree or Higher National Certificate in Mechanical Engineering and experience in an engineering drawing office is desirable.

Salary N.J.B. Class BX, Grade 11, £855/£1,165 per annum.

(3) ASSISTANT ENGINEER (Ref. C5/61).

Applicants should have had experience in the designing of industrial electrical equipments and a knowledge of their applications and economics. Duties will include assisting in the advising of consumers on industrial electrical applications, developing special-purpose electrical equipment and general load development activities.

Possession of an Engineering Degree or Higher National Certificate in Electrical Engineering would be an advantage.

Salary N.J.B. Class BX, Grade 11, £855/£1,165 per annum.

Applications on the standard form, quoting appropriate reference, should be submitted to the Secretary, South of Scotland Electricity Board, Inverlair Avenue, Glasgow, E.4, not later than 5th May, 1961. 695

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

Littlebrook Power Station

ASSISTANT ENGINEER (Efficiency) (Vacancy No. 118/61).

Candidates should possess technical qualifications to at least H.N.C. standard and practical experience in generating station work would be an advantage. The successful applicant will assist in the Station Efficiency Section in investigations into the thermal performance of plant, and will be required to work independently and to take the initiative in solving problems which arise.

Salary N.J.B. Class L, Grade 14 £940-£1,065 per annum including London Allowance.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Littlebrook Power Station, Nr. Dartford, Kent, to arrive by 1st May. 729

ADMINISTRATIVE COUNTY OF LEICESTER

ASSISTANT ELECTRICAL ENGINEER £960-£1,140.

Candidates must be Associate Members of the Institution of Electrical Engineers or be in possession of the Higher National Certificate and be experienced in the design of electrical installations for all types of buildings. Removal expenses and lodging allowance may be paid to a married man.

Apply by Friday, 5th May, 1961, on the form available from the County Architect, 123, London Road, Leicester. 712

CENTRAL ELECTRICITY GENERATING BOARD

SOUTH EASTERN DIVISION

RICHBOROUGH GENERATING STATION

STATION SUPERINTENDENT

VACANCY NO. 119/61

Applications are invited for the post of Station Superintendent at Richborough Generating Station, which will commission in 1962 and is designed for an ultimate capacity of 360 MW (3 × 120 MW sets of unit construction).

The salary is in accordance with N.J.M. Grade 5, Class C, £2,170 to £2,380 per annum.

Applicants should submit details in the form they judge will be of the greatest assistance in selecting a short list for interviewing.

Applications should be sent to the

Personnel Officer
Central Electricity House
Lower Ham Road, Kingston-upon-Thames, Surrey
to arrive by 19th May

728

THE BAHRAIN PETROLEUM COMPANY LIMITED

require a

MECHANICAL ENGINEER

for their
Power and Utilities Department

★

The commencing salary will be dependent upon qualifications and experience, in addition to which the following are provided :—

- **FREE AIR-CONDITIONED ACCOMMODATION**
- **LIVING ALLOWANCE**
- **INITIAL KIT ALLOWANCE**
- **FREE MEDICAL ATTENTION**
- **PAID HOME AND LOCAL LEAVES** *(passages paid for the former and generous) assistance towards the latter).*
- **PENSION AND PROVIDENT FUND SCHEMES**

The need is for a young single or married man, preferably not over 28 years of age, who should be a graduate of the Institution of Mechanical Engineers and have at least two years' experience in power plants or similar works. Graduate members of the Institution of Electrical Engineers or graduates with a B.Sc. in Engineering who have had the necessary practical experience would also be considered. The successful applicant will be required for work connected with the operation and control of high pressure boilers, straight condensing and extraction turbogenerators, utility steam raising plants etc. He may also be required to work on the high voltage electrical distribution systems and on extensive refinery utilities distribution systems.

Apply in writing with full particulars, quoting "ETS/PU" to

CALTEX SERVICES LIMITED

Caltex House, Knightsbridge Green, London S.W.1

CALTEX

727

BACKER ELECTRIC COMPANY LIMITED

require a

DESIGN ENGINEER DRAUGHTSMAN

Applicants should preferably have experience of electric heating techniques as applied to domestic appliances and or industrial equipment and be capable of leading and controlling a small drawing office staff engaged on the design and application of tubular sheathed electric heating elements.

Apply stating age, present salary and fullest details of qualifications, education and past experience to the **Secretary, Backer Electric Company Limited, Fitzwilliam Road, Rotherham.** 630

Situations Vacant *(continued)*

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

ASSISTANT ENGINEER (Relief), STAYTHORPE "A" POWER STATION (Vacancy No. 80/61).

Applications are invited for the position of Assistant Engineer (Relief) at Staythorpe "A" Power Station, nr. Newark, Notts.

Applicants should have received a sound electrical training and have had experience of the operation and control of modern high-pressure boiler and turbine plant. Preference will be given to candidates who possess the Higher National Certificate in Mechanical or Electrical Engineering or its equivalent.

Salary will be in accordance with Class K, Grade 12 (£965 - £1,090) per annum) of the National Joint Board Agreement, plus 10% allowance whilst engaged on shift duties.

Closing date for receipt of applications, 28th April, 1961.

ASSISTANT ENGINEER (Operation), DRAKELOW "A" POWER STATION (Vacancy No. 81/61).

Applications are invited for the position of Assistant Engineer (Operation) at Drakelow "A" Power Station, near Burton-on-Trent, Staffs.

Experience desirable in control of boilers and turbines at high pressure and temperature, pulverised fuel, together with electrical control room experience. Technical qualifications to Higher National standard desirable.

Salary will be in accordance with Class J, Grade 10 (£1,040 - £1,165 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 28th April, 1961.

SHIFT CHARGE ENGINEER, BURTON-ON-TRENT POWER STATION (Vacancy No. 82/61).

Applications are invited for the position of Shift Charge Engineer at Burton-on-Trent Power Station, Wetmore Road, Burton-on-Trent, Staffs.

Sound technical training and practical experience in the control and operation of steam generating plant and main switchgear are required. Appropriate qualifications an advantage.

Salary will be in accordance with Class E, Grade 7 (£965 - £1,090 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 28th April, 1961.

ASSISTANT SHIFT CHARGE ENGINEER, BURTON-ON-TRENT POWER STATION (Vacancy No. 83/61).

Applications are invited for the position of Assistant Shift Charge Engineer at Burton-on-Trent Power Station, Wetmore Road, Burton-on-Trent, Staffs.

Applicants should possess H.N.C. or equivalent qualifications and have experience in power station operation.

Salary will be in accordance with Class E, Grade 9 (£825 - £940 per annum) of the National Joint Board Agreement, plus an allowance for shift duties.

Closing date for receipt of applications, 28th April, 1961.

SECOND ASSISTANT STATION CHEMIST, HIGH MARNHAM POWER STATION (Vacancy No. 84/61).

Applications are invited for the post of Second Assistant Station Chemist at High Marnham Power Station, nr. Newark, Notts.

Candidates should be experienced in the analysis and testing of coal, oil and water, and in the application of the results to high-pressure plant. Candidates should also hold the Higher National Certificate in Chemistry or its equivalent.

Salary and conditions of service in accordance with Class N, Grade 11 (£1,275 to £1,410 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28th April, 1961.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Station Superintendent concerned, and should be returned to him by the date stated.

O. S. WOODS,
Divisional Controller.

736

BRUSH

(A member of the Hawker Siddeley Group — Industrial Division)

DRAUGHTSMEN

TRANSFORMERS

SWITCHGEAR

ROTATING ELECTRICAL MACHINES

MOTOR CONTROL GEAR

ELECTRIC AND DIESEL ELECTRIC LOCOMOTIVES
(Mechanical, Control Gear and Electrical Machines)

GENERAL ENGINEERING

If you are a qualified Draughtsman and interested in one of the above vacancies, please apply to

Mr. A. Garner
Brush Electrical Engineering Company Limited
Loughborough, Leicestershire

quoting reference: PL.9935 and giving brief details of your qualifications and experience.

ALL APPLICATIONS WILL BE TREATED IN THE STRICTEST CONFIDENCE.

The Company is situated some 15 miles from Leicester, Nottingham and Derby on the outskirts of a small town amid the pleasant Leicestershire countryside and away from the smoky industrial environment. Schooling facilities are good for all grades of education, including advanced studies at Technical Colleges and Universities in the district. In appropriate cases assistance with housing and removal expenses can be considered.

710

NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified engineers for the following appointments which are subject to the conditions of the National Joint Board.

Area Board Headquarters

FOURTH ASSISTANT ENGINEER, Communications Sub-Section, with location at North Tees Power Station, Billingham.

Applicants should have had a sound training in the telecommunications field and be capable of maintaining manual and automatic exchange systems and supervisory equipment. A knowledge of cable carrier systems and V.H.F. radio will be an advantage.

Salary Schedule B, Class AX, within Grades 11/10, £855/£1,165 per annum.

Wear Sub-Area

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER, Chester-le-Street.

Applicants should have experience in the utilisation of electrical energy in commercial and domestic premises, a knowledge of installation work, and be conversant with tariffs, sales and all aspects of consumers' service.

Salary Schedule A, Class G, Grade 5, £1,275/£1,410 per annum.

Tees Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER, Darlington.
Salary Schedule A, Class F, Grade 7, £1,040/£1,165 per annum.

SECOND ASSISTANT DISTRICT ENGINEER, Middlesbrough.
Salary Schedule A, Class F, Grade 7, £1,040/£1,165 per annum.

SECOND ASSISTANT DISTRICT ENGINEER, Stockton.
Salary Schedule A, Class G, Grade 7, £1,115/£1,245 per annum.

Applicants for the above appointments should have experience in the design, construction, maintenance and operation of h.v. and l.v. overhead and underground distribution systems in urban and rural areas, substation plant and ancillary equipment.

THIRD ASSISTANT DISTRICT ENGINEER, Darlington.
Salary Schedule A, Class F, Grade 9, £890/£1,015 per annum.

THIRD ASSISTANT DISTRICT ENGINEER, Middlesbrough.
Salary Schedule A, Class F, Grade 9, £890/£1,015 per annum.

3 THIRD ASSISTANT DISTRICT ENGINEERS, Redcar.
Salary Schedule A, Class G, Grade 9, £965/£1,090 per annum.

THIRD ASSISTANT DISTRICT ENGINEER, Stockton.
Salary Schedule A, Class G, Grade 9, £965/£1,090 per annum.

Applicants for the above appointments should have experience in the construction, operation and maintenance of e.h.v. and m.v. overhead and underground distribution systems in a mixed urban and rural district.

It should be noted by applicants for the appointments at Middlesbrough and Darlington that there is every likelihood of the classification of these Districts being raised from "F" to "G" in the not too distant future.

Applications in writing, stating age qualifications and experience, to be received by Assistant Secretary (Establishments), North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, 1, within ten days of the appearance of this advertisement. 742

CONSULTING ENGINEERS REQUIRE INTERMEDIATE AND JUNIOR ELECTRICAL ENGINEER ASSISTANTS

to be capable of designing under limited supervision all types of internal and external electrical installations in connection with hospital, education and industrial building programmes. These situations are for permanent staff and carry attractive salary coupled with pleasant working conditions, superannuation and life assurance scheme.

Please apply :—

E. G. PHILLIPS SON & PARTNERS
26, Annesley Grove, Nottingham

606

THE ENGLISH ELECTRIC COMPANY LIMITED

A PROCESS ENGINEER

is required for technical control of the manufacture of resin bonded paper bushings and oil impregnated paper bushings. Some previous experience of bushing manufacture is essential and some knowledge of insulation chemistry would be an added advantage.

The works is situated within a few miles of the Ribble Valley. Assistance can be given in housing.

Send details of qualifications and experience to Dept. G.P.S., English Electric House, Strand, London, W.C.2 quoting reference ER194B.

675

Standard Telephones and Cables Limited

(Quartz Crystal Division, Harlow)

PHYSICISTS **ELECTRONIC**
ELECTRICAL **MECHANICAL ENGINEERS**

Capable men with good qualifications are required for a variety of interesting posts in the field of Production Engineering, Development, and Research at salaries ranging from £1,000 per annum upwards.

Housing accommodation can be made available to successful applicants.

Suitably qualified Engineers are invited to write to the

Personnel Manager
STANDARD TELEPHONES AND CABLES LIMITED
Quartz Crystal Division, West Road, Temple Fields
Harlow, Essex

FOSTER WHEELER LIMITED

have immediate vacancies for

DESIGN DRAUGHTSMEN, DRAUGHTSMEN AND MATERIAL CONTROLLERS

for the Electrical Section of the Process Plants Division.

The work is in connection with Oil Refineries and Petro-chemical Plants and it is essential that applicants should have had experience of large industrial electrical installations.

These are permanent positions offering good salaries, commensurate with experience.

New offices, 5-day week, Pension and Life Assurance Schemes, Luncheon Vouchers, Bonus Scheme.

We shall be pleased to arrange evening interviews.

Please write fully giving age, qualifications and experience, and quoting Ref: 59/AK, to:

Office Manager, FOSTER WHEELER LIMITED,
Foster Wheeler House, Chapel Street, London, N.W.1.
(Adjacent to Edgware Road Station)

564

THE STEEL COMPANY OF WALES LIMITED (TINPLATE DIVISION)

APPLICATIONS are invited for the following posts at the TROSTRE WORKS, LLANELLY—a modern cold reduction tinplate plant :—

ASSISTANT ELECTRICAL ENGINEER.
Qualifications to H.N.C. or near equivalent. A good background of electrical training and experience is required, with particular reference to modern electrical control systems and D.C. variable speed drives.

ASSISTANT ELECTRONIC FOREMAN.
This post requires a man with education to O.N.C. or equivalent level, and with experience of industrial electronics. The ability to handle a team of men on maintenance work in a continuously operating plant is essential.

Good working conditions including canteen facilities. A contributory pension scheme is available.

Applications, giving full details of education, experience and salary required, should be addressed to :—

The Supt. Labour and Wages
The STEEL COMPANY OF WALES Ltd.
(Tinplate Division)
Carmarthen Road, Swansea, Glam.

to be received within 10 days of the date of this advertisement. 745

BRITISH RAILWAYS

(Southern Region)

require a

TECHNICAL ASSISTANT (INSPECTION)

in the Office of Mechanical and Electrical Engineer (Traction), London Bridge, for the inspection and testing of electric and diesel electric rolling stock and power supply equipment at contractors' works.

Applicants should have had a sound technical training. Manufacturing experience essential. Higher National Certificate in Electrical Engineering or equivalent desirable.

Commencing salary £1,070 per annum rising to £1,145 after two years.

Application forms may be obtained from the Chief Mechanical and Electrical Engineer, British Railways, Southern Region (Staff Section), 15, St. Thomas Street, London Bridge, London, S.E.1.

677

J. & P.

WORKS SUPERINTENDENT

TRANSFORMER DEPT.

Applications are invited from suitably qualified men for the post of Superintendent of a Works producing transformers up to 45 MVA, 132 kV. This is an interesting and permanent appointment with good prospects. The Company offers good holiday and sick pay conditions and operates a Superannuation Scheme.

Applications, which will be treated in confidence, giving details of qualifications, experience, age and present salary, should be addressed to the Employment Manager, Johnson & Phillips Limited, Charlton, London, S.E.7.

678

Situations Vacant (continued)

SOUTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER, WEST CORNWALL, Outposted at FALMOUTH.

Salary within Class G, Grade 9, Salary Scale 7, £965 to £1,090 per annum of the N.J.B. Agreement.

The successful candidate will be outposted at Falmouth and will be responsible for construction, operation and maintenance of the distribution system up to and including 33 kV within the Branch area or elsewhere in the District, as necessary. The person appointed will be required to undertake standby duties.

Previous experience, and qualifications leading to the H.N.C. in Electrical Engineering, will be an advantage and the possession of a current driving licence is desirable.

Applications to be made on Standard Form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, 13, Basset Road, Camborne, Cornwall. Closing date for receipt of completed applications is 6th May, 1961.

FOURTH ASSISTANT DISTRICT ENGINEER, TORBAY.

Salary within Class G, Grade 10, Salary Scale 6, £890 to £1,015 per annum of the N.J.B. Agreement.

The successful candidate will be mainly responsible for work in connection with the operation and maintenance of the distribution system in the Torbay urban area; he may also be required to undertake other general engineering duties, including standby, as required.

Applicants should have had experience in the operation and maintenance of underground and overhead systems, and possession of the Higher National Certificate in Electrical Engineering would be an advantage. The ability to drive a car and the possession of a current driving licence is desirable.

Applications to be made on Standard Form AE6/ACT, OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, Union Street, Torquay. Closing date for receipt of completed applications is 6th May, 1961.

FOURTH ASSISTANT DISTRICT COMMERCIAL ENGINEER, TAUNTON.

Salary within Class G, Grade 11, Salary Scale 5, £825 to £940 per annum of the N.J.B. Agreement.

The successful candidate will be responsible to the Assistant Commercial Engineer for the maintenance of consumer service in the Taunton and Wellington urban areas and be required to assist generally in the Commercial Department.

He will be required to take charge of the apparatus and repair department, to give technical advice to consumers, and be responsible for the day-to-day work of installation inspectors, meter fixers and meter readers.

Candidates should have a wide knowledge of all types of electrical appliances.

Applications to be made on Standard Form AE6/ACT, OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, The Parade, Taunton. Closing date for receipt of completed applications is 6th May, 1961. 746

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

No. 4 Sub-Area

ASSISTANT CONSUMERS' ENGINEER required at Llanrwst. Salary within the range £715/£805 per annum (N.J.B. E.11, Scale 3).

Applicants should have completed a recognised electrical apprenticeship and had some technical training. Duties will include estimating, preparation of specifications and supervision of contracting work, advising consumers on matters relating to electricity supply and the utilisation of electricity. The ability to speak Welsh and to drive would be an advantage.

The work is of an interesting nature, and the post is pensionable with good working conditions and reasonable future prospects to suitable staff.

Appointment subject to medical examination.

Application forms obtainable from the Manager, No. 4 Sub-Area, Rhostyllen, near Wrexham.

Closing date, 28th April, 1961. 676

VICKERS-ARMSTRONGS (SHIPBUILDERS) LIMITED

require at

BARROW-IN-FURNESS

a number of

ELECTRICAL ENGINEERS

for the testing and commissioning of the electrical systems in Naval nuclear reactor installations. The work covers the preparation of system test specifications and the technical supervision of testing in the fields of reactor instrumentation, control and protection: power generator and distribution and machinery control.

A Degree, H.N.C., or equivalent qualifications, backed by practical training and experience in one or other of the above fields is required.

There are long term prospects in systems design work for which this project will form an excellent basis.

This opportunity will primarily interest the young Engineer seeking to widen his experience, but mature Engineers with possibly a relevant Service background would be suitable for some of the posts.

Salaries will be based on qualifications and experience.

Applications should be addressed to the :

Chief Electrical Engineer
VICKERS-ARMSTRONGS (SHIPBUILDERS) LIMITED
BARROW-IN-FURNESS, LANCASHIRE

688

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

TECHNICAL STAFF

Technical staff with Electronics experience are required by the National Institute for Research in Nuclear Science at the Rutherford High Energy Laboratory, Harwell, Berkshire.

The successful applicants will be members of a small team engaged in setting up and calibrating a wide range of electronic and electrical instruments.

Applicants should have had a recognised engineering apprenticeship or have had equivalent training. It would be an advantage to possess an Ordinary National Certificate. Experience in the repair, fault finding and calibration of general electronic and physical instruments is required.

Salaries are in the scale £885 (at age 26) to £1,210.

There is a contributory superannuation scheme and assistance is given with housing.

Please send a POST CARD for an application form to

The Personnel Officer
The Rutherford High Energy Laboratory
Harwell, Didcot, Berks.
quoting reference VN47/48

674

SURREY COUNTY COUNCIL

APPLICATIONS invited for appointment of ELECTRICAL ENGINEERS. Salary range £960-£1,310 p.a. plus £45 p.a. London allowance. Successful candidates will be paid according to age and experience and will receive approved removal expenses. Applicants should state salary they expect to receive. Must be A.M.I.E.E. and have had experience in design of large electrical services installations. The successful applicant must be capable of taking charge of works from commencement to final completion.

Full details, present salary and three copy testimonials, preferably one from present employer, to County Architect, County Hall, Kingston-upon-Thames, as soon as possible. 701

ELECTRICAL DESIGN-DRAUGHTSMAN

FULLY qualified Electrical Design-Draughtsman required for the planning and the general technical co-ordination of the electrical design in connection with standard and special type of Resistance, Vacuum and Induction Furnaces.

This work will include the preparation of data so that control circuit diagrams, purchasing requisitions, control panels, layouts, etc., can be prepared for their installation.

Applications, which will be treated in the strictest confidence, should give full details of experience and qualifications, and should be addressed to the Secretary, Wild-Barfield Electric Furnaces Ltd., Elecfurn Works, Otterspool Way, Watford, Herts. 689

AIR MINISTRY

require ASSISTANT MECHANICAL AND ELECTRICAL ENGINEERS for design, construction and maintenance of installations on airfields, radar stations, missile bases, workshops and maintenance units for R.A.F. at home and overseas as well as certain Civil Airports.

SALARY according to age, quals. and exp. from £936 (at 25) to £1,430 max. with increase for London and slight decrease in country districts. In addition salary is increased by £75 p.a. (within the maximum of scale) after 2 years' approved service subject to being Corporate Members of Institution of Mechanical or Electrical Engineers. Appointments long term with good prospects of pension and advancement to numerous posts in higher grades, viz.:—

- Mechanical and Electrical Engineers, £1,456-£1,950, 125 posts.
- Senior Mechanical and Electrical Engineers, £2,080-£2,392, 34 posts.
- Superintending and above Mechanical and Electrical Engineers, £2,650 upwards, 9 posts.

Vacancies occurring in higher grades are filled by promotion of existing staff.

Good opportunities for acquiring exp. overseas where special allowances ranging at present up to £1,800 p.a. according to location and marital status are payable in addition to higher salary. 5-day week with 4 weeks 2 days paid leave p.a. initially.

Quals.: (a) University degree or equiv. diploma in electrical and/or mechanical engineering with at least 2 years' apprenticeship; or (b) Graduate or Corporate Member of I.E.E. with at least 3 years' apprenticeship; or (c) Graduate or Corporate Member of I.Mech.E., appreciable electrical engineering exp. with at least 3 years' apprenticeship. In addition all candidates should have been employed for min. of 2 years with well established engineering concern and gained wide exp. in both electrical and mechanical engineering practice.

Applicants must be natural born British subjects between ages 25 and 45. Forms from Ministry of Labour, Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting D 128/1A. Selection will be by interview in London and certain expenses will be reimbursed. 248

AIR MINISTRY

require STATION ENGINEERS (G.D.) Grade III at R.A.F. and Ministry of Aviation stations throughout the United Kingdom. The work consists of installation, operation and maintenance of high and medium-voltage electrical distribution systems, electrical power and lighting installations, control systems and generating plant; knowledge of heating and ventilating plant and diesel engines an advantage.

SALARY, which is dependent upon age, quals. and exp., ranges from £776 (age 25) to £961 max. in Grade III. There are pension prospects and also opportunities of advancement to numerous posts in the higher grades, viz.:—

- Technical Grade II:
  - £961 - £1,098 (276 posts).
- Inspector of Works Grade 1:
  - £1,098 - £1,348 (137 posts).
- Technical Grade B:
  - (£1,348 - £1,552 (25 posts).
- Technical Grade A:
  - £1,439 - £1,697 (17 posts).

Vacancies occurring in the higher grades are, as a rule, filled by promotion of existing staff.

Overseas tours for which special allowances ranging at present up to £1,800 p.a. are payable in addition to a higher salary. Internal training courses are provided and financial assistance and time off is allowed for recognised courses of study leading to higher quals. 5-day week with 18 days' paid leave a year initially.

Quals.: Applicants, who must be natural-born British subjects, up to age 55, should hold O.N.C. Elect. or C. and G. Electrical Technician's Cert. or equiv., and must also have had recognised apprenticeship with firm of good repute plus 3 years' employment in electrical engineering, preferably on operation and maintenance of mine, factory or workshops plant and services. Preference to candidates with supervisory experience.

Forms from Manager (PE.1), Ministry of Labour, Professional and Executive Register, Atlantic House, Farringdon Street, London, E.C.4. Candidates selected will normally be interviewed in London and certain expenses reimbursed. Only applicants selected for interview will be advised. 249

WE ARE LOOKING FOR

Britain's Top Lighting Designer

For the most important job in the lighting industry. He will be expected to develop quickly fluorescent lighting fittings of all types and with the materials they incorporate, the techniques they employ and the sales appeal they enjoy, lead the lighting industry in this country for many years to come.

He will be capable of complete liaison with both marketing, research and production resources and will develop and control his own design and engineering unit.

He will be working for a company whose technical, production, sales and development organisations are known throughout the world.

WRITE TO BOX 673

YORKSHIRE ELECTRICITY BOARD

No. 6 (Hull) Sub-Area

HULL DISTRICT

THIRD ASSISTANT
DISTRICT ENGINEER.

Candidates should have as a minimum qualification the Higher National Certificate in Electrical Engineering and have had responsible experience in planning, construction, operation and maintenance of underground and overhead systems.

The successful applicant will be required to work initially in the East Unit of the Hull District and undertake standby duty.

Salary N.J.B. Class K, Grade 9 (Scale 10), £1,190/£1,325 p.a.

Applications, together with the names of two referees, should be sent to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 5th May, 1961.

No. 3 (Sheffield) Sub-Area

FOURTH ASSISTANT ENGINEER
(Operation and Maintenance).

Applicants should have had experience in the operation of high-voltage systems. The successful candidate will be required to take part in a rota of shift duties covering the Sheffield City network.

Salary N.J.B. Class N, Grade 13 (Scale 9) plus 10% shift enhancement, £1,226 10s./£1,369 10s. p.a.

Applications, together with the names of two referees, should be sent to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, 1, not later than 5th May, 1961. 737

CITY OF NOTTINGHAM EDUCATION COMMITTEE

People's College of Further Education

Principal: W. W. Dixon, M.Sc., A.R.I.C.

APPLICATIONS are invited for the post of ASSISTANT GRADE B in the Department of Electrical Engineering, to commence 1st September, 1961. Applicants should have a Higher National Certificate in Electrical Engineering as a minimum qualification.

Salary Burnham Technical Scale, i.e., £700 × £27 10s. × £37 10s. (1) to £1,150 per annum, with additions for graduate qualifications and training. Increments allowed for approved industrial or teaching experience.

Further particulars and forms of application may be obtained from the undersigned and should be returned by 28th April, 1961.

W. G. JACKSON,
Director of Education.

Exchange Buildings,
Nottingham. 699

NORTH WESTERN ELECTRICITY BOARD

Second Assistant District Engineer, South District, Cheadle

The duties will include the supervision of the erection and maintenance of substation switchgear, laying and jointing of cables, and switching operations on the H.V. and L.V. systems within the District as required. Applicants should have had a wide general experience on the distribution side of electricity supply and be prepared to undertake standby duties.

Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary scale £1,115/£1,245 p.a., Grade G.7. N.J.B. conditions.

Fourth Assistant District Commercial Engineer (Technical Sales and Service), North District, Salford

Applicants should be capable of assisting the Technical Sales and Service Engineer in connection with industrial and commercial matters. Good technical training essential.

Salary scale £715/£805 p.a., Grade G.13. N.J.B. conditions.

Applications on forms to be obtained from the Manager (Staff Vacancies), No. 1 Sub-Area, North Western Electricity Board, Town Hall, Manchester, and returned to him by 1st May, 1961. 696

LONDON ELECTRICITY BOARD

Engineer (Meter)

APPLICATIONS are invited for the above position in the Meter and Test Branch of the Chief Engineer's Department at 1, West Street, Bromley, Kent.

The successful applicant will be required to assist in the work of repairing and testing meters for a part of the Board's area, which at present is covered by the Board's testing stations at Bermondsey, Erith and Bromley. He will initially be based at West Street, Bromley, but later will be located at the Board's testing station now under construction at Bexleyheath.

Candidates should preferably hold the Higher National Certificate, must have recent experience of modern methods of repairing and testing large numbers of meters and the control of staff, and be capable of making a contribution to the design of a meter testing station.

The post is graded under Schedule B of the National Joint Board Agreement as Grade 8, Class BX, salary range £1,155 to £1,460 per annum, inclusive of London allowance.

Application form obtainable from the Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned completed within fourteen days of the publication date of this notice. Please quote ref. PER/V/3231/R. 741

***Situations Vacant** (continued)*

BARNET GROUP HOSPITAL MANAGEMENT COMMITTEE

Group Superintendent Engineer

APPLICATIONS are invited for the post of GROUP SUPERINTENDENT ENGINEER (40½ to 50 points). Salary scale £1,155 × £35 (3) × £40 (2) to £1,340 per annum, plus London weighting £50 per annum. The officer appointed will be responsible to the Management Committee for the satisfactory operation, maintenance and co-ordination of the engineering services and activities (including both mechanical and electrical) of all the hospitals, clinics and offices in the Group, and will be directly in charge of the engineering services of the main general hospital in the Group (Barnet General Hospital, 490 beds) and its smaller ancillary hospitals.

In addition to normal apprenticeship and a thorough practical mechanical engineering training, candidates should have passed an examination in engineering technology and hold one of the following qualifications (or equivalent qualification approved by the Minister or Secretary of State for Scotland):—

(a) Extra First Class Certificate of Competency in Marine Engineering, or equivalent Naval Certificate.
(b) Higher National Diploma in Mechanical Engineering.
(c) Higher National Certificate in Mechanical Engineering.
(d) Diploma in Mechanical Engineering of a Technical College recognised for the award of the Higher National Certificate.

A house, situated adjacent to the main hospital is available for occupation and would be rented from the Management Committee.

Applications, giving full details of training, experience, with the names of three referees, should be sent to the Group Secretary, Barnet Group Hospital Management Committee, 1, Wellhouse Lane, Barnet, Herts., not later than 23rd May. 743

ASSISTANT MAINTENANCE ENGINEER

required to supervise, with foreman, the maintenance of engineering services in fully air-conditioned 25-storey Manchester office building due to be completed in July, 1962.

Good practical experience of general electrical maintenance work, and technical education to Higher National Certificate or equivalent, are essential.

Drive, initiative and some administrative experience highly desirable as this appointment is progressive and permanent. Age 35 to 45. Commencing salary £1,100 per annum. Contributory pension scheme.

Apply in confidence, before 31st May, 1961, giving age and fullest details of training, experience and qualifications to the Assistant Secretary, Co-operative Insurance Society Ltd., 109, Corporation Street, Manchester, 4, and mark the envelope "Engineer."

683

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

DISTRICT ENGINEER required in the Aberystwyth District of the Board's No. 4 Sub-Area. Salary within the range £1,275/£1,410 per annum (N.J.B. Scale 11).

Applicants should be experienced in the design, construction and operation of overhead and underground distribution systems, and have a knowledge of the technical and economic factors of system layout and design. Technical qualifications essential.

The successful candidate will be responsible to the District Manager, and should have good organising ability and be able to control staff.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, Nr. Wrexham.

Closing date, 5th May, 1961. 739

GOVERNMENT OF THE FEDERATION OF RHODESIA AND NYASALAND

Assistant Electrical Engineer

Ministry of Works

APPLICATIONS are invited for appointment as ASSISTANT ELECTRICAL ENGINEER. Applicants must hold the minimum qualifications of a relevant B.Sc. degree of an approved university, or be a Graduate Member of the Institution of Electrical Engineers, or hold technical qualifications acceptable to the Ministry of Works. Previous relevant experience of office work would be an advantage.

Commencing salary in the following scales will depend on relevant experience and qualifications :—

(a) PERMANENT PROFESSIONAL OFFICER: £735 × £105 to £1,155 × £78 15s. to £1,312 10s. × £52 10s. to £1,732 10s. per annum ; or
(b) PROFESSIONAL OFFICER (Three-year contract): £1,552 10s. × £52 10s. (first year) to £1,575 × £52 10s. (second year) to £1,627 10s. p.a.; or
(c) NON-PROFESSIONAL OFFICER, on Three-year contract, with suitable technical qualifications and experience: £1,386 × £52 10s. (first year) to £1,438 10s. × £52 (second year) to £1,491 p.a.

The successful applicant will be initially stationed in Salisbury, but will be subject to transfer. He will be responsible, through a Senior Officer, to the Chief Electrical Engineer. The duties will include design and preparation of specifications for various types of electrical installations, including site distribution schemes up to 11 kV, and supervising the work of two or more technical assistants.

Family passages provided, generous leave, medical aid, low income tax, opportunities for sports and recreation in a pleasant climate.

Application forms and further information from the Secretary (R), Rhodesia House, 429, Strand, London, W.C.2.

Closing date: 10th May, 1961. 707

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS are invited for the following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule B. Salary includes London allowance.

FOURTH ASSISTANT ENGINEERS
(Development) (2),
ELECTRICAL DEPT. (Technical Section),
DIVISIONAL HEADQUARTERS,
GENERATION HOUSE
(Vacancy No. 61/207).

Applicants should have experience in the manufacture and testing of H.V. electrical equipment used in the supply industry and should be familiar with symmetrical component theory and methods of network analysis. Academic qualifications equivalent to Graduate Membership of the Institution of Electrical Engineers will be an advantage. Previous applicants for Vacancy No. 60/1011 will be considered and need not re-apply.

Salary Class BX, Grades 9, 10 or 11, £1,055-£1,375, £985-£1,295, £905-£1,215 per annum respectively.

Applications, quoting vacancy number, may be made to (or on form from) Personnel Officer, Central Electricity Generating Board, London Division, P.O. Box No. 136, London, W.1, to be received not later than 2nd May, 1961. 697

DORSET COUNTY EDUCATION COMMITTEE

South Dorset Technical College

APPLICATIONS are invited for the post of ASSISTANT GRADE "A" to teach ELECTRICAL INSTALLATION work up to the standard of the C.G.L.I. "C" Certificate. Industrial experience in this field is essential.

Salary scale £520-£1,100, plus additions for training and qualifications. Starting salary according to industrial experience.

Further particulars and forms of application may be obtained from the Principal, South Dorset Technical College, Newstead Road, Weymouth, to whom completed applications must be returned by 1st May, 1961. 714

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts :—

Birmingham Area

FOURTH ASSISTANT ENGINEER
(Wayleaves) (Area Offices).

The successful applicant will be required to supervise the plotting of routes, cable easements, profiles, material schedules, negotiation and preparation of wayleave agreements, substations site acquisitions, etc. Salary within the ranges £1,115/£1,245 or £1,190/£1,325 per annum (N.J.B. Grades N.13/12), according to qualifications and experience.

Apply by letter within 7 days, stating age, experience, present position and salary, to Area Manager, Midlands Electricity Board, 14, Dale End, Birmingham, 4.

South Staffs. and North Worcs. Area

THIRD ASSISTANT ENGINEER
(Maintenance Section)
(Area Offices).

Duties will include maintenance and testing of H.V. switchgear, transformers, tap changers, supervisory equipment and protective equipment, the location of faults and the maintenance of a large private automatic telephone system. Salary £1,275/£1,410 per annum (N.J.B. Grade M.10).

Apply by letter within 14 days, quoting ref. SS/T/521, stating age, qualifications, experience, present position and salary, to Acting Area Manager, Midlands Electricity Board, P.O. Box No. 9, Toll End Road, Tipton, Staffs.

F. W. CATER,
Secretary. 711

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern and Yorkshire Region

Appointment of Third Assistant Engineer, Steam Testing Department, Dunston

APPLICATIONS are invited to fill a vacancy for a THIRD ASSISTANT ENGINEER in the Plant Performance Testing Section, based at Dunston-on-Tyne.

Candidates should have the technical qualifications for admission to associate membership of a recognised institution.

Experience of operation, testing, design or experimental development of modern high-pressure steam plant is required.

The salary for the appointment (which is superannuable) will be in accordance with the National Joint Board Agreement, Grade 8, Schedule B (£1,105-£1,325 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1, Whitehall Rd., Leeds, 1, to whom they should be returned to arrive not later than 1st May, 1961. 713

LONDON ELECTRICITY BOARD

General Assistant Engineers

APPLICATIONS are invited for the above positions. Initially the successful candidates will be located at 84, Romford Road, Stratford, London, E.15.

Applicants should have a sound technical education to the standard of the Higher National Certificate, and have completed a recognised period of training in the electricity industry, or have equivalent experience.

The posts are graded under Schedule B of the National Joint Board Agreement as Class BX, Grade 15, £695 to £920 per annum, inclusive of London allowance.

Applications, stating age, qualifications and experience should be sent direct to the Manager at the above address, within ten days of the publication date of this notice. Please quote ref. PER/V/3110/R. 740

SOUTH EASTERN ELECTRICITY BOARD

JOINTER,
Crawley and Horsham District.

Wages, Jointer 5s. $4\frac{1}{2}$d. per hour or Jointer (E.H.T.) 5s. $6\frac{3}{4}$d. per hour for a 42-hour 5-day week under N.J.I.C. Agreement.

Applications quoting ER and naming two referees to District Manager, SEEBOARD, 50/52, The Broadway, Crawley, Sussex, by 3rd May, 1961.

FITTER (Electrical),
Crawley and Horsham District.

Wages 5s. $6\frac{3}{4}$d. per hour for 42-hour 5-day week under N.J.I.C. Agreement.

Applicants should be experienced in the erection and maintenance of H.V. and L.V. switchgear and transformers.

Applications quoting ER and naming two referees to District Manager, SEEBOARD, 50/52, The Broadway, Crawley, Sussex, by 3rd May, 1961.

ASSISTANT DISTRICT ENGINEER,
West Kent District.

Salary £875 to £990, including London allowance, under N.J.B. Agreement, Class G, Grade 11. Superannuable.

Applicants should have technical qualifications up to H.N.C. standard with training or experience in the construction, operation and maintenance of underground and overhead distribution systems up to 11 kV.

Applications quoting ER and naming two referees on forms from District Manager, SEEBOARD, 286, High Street, Orpington, Kent, by 3rd May, 1961.

DISTRICT SENIOR COMMERCIAL
ASSISTANT (Sales),
Central Sussex District.

Salary £1,020-£1,140 per annum maximum on N.J.C. 5. Superannuable.

The successful applicant will be responsible for sales promotion and publicity and the co-ordination of the four showrooms in the district. His duties will also include the control of showroom stock.

Applications quoting ER and naming two referees to District Manager, SEEBOARD, Electra House, Church Road, Haywards Heath, by 3rd May, 1961.

GEORGE WRAY,
Secretary.

744

REQUIRED BY CONSULTING ENGINEERS

INSPECTING ENGINEER

to be concerned principally with mechanical plant.

Should have recognised apprenticeship and some experience manufacture and testing of prime movers. Minimum qualification H.N.C.; should be capable writing and analysing reports. Based on London, but considerable home and Continental travelling involved. Salary according to qualifications.

Apply in writing, giving full details, age and experience, to Preece, Cardew & Rider, 8, 10 & 12, Queen Anne's Gate, Westminster, London, S.W.1, not later than 14 days after publication.

694

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT CONSUMERS' ENGINEER required in the Northwich District of the Board's No. 2 Sub-Area. Salary within range £765/£870 per annum (N.J.B. F/11).

Duties will include estimating for contracting work, and advising consumers on matters relating to electricity supply and the utilisation of electrical equipment. Previous experience of work of this nature and a technical qualification desirable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway House, Northwich, Cheshire. Closing date, 4th May, 1961.

Previous applicants need not re-apply. 738

CITY AND COUNTY OF BRISTOL EDUCATION COMMITTEE

Bristol Technical College

THE Governors invite applications from suitably qualified and experienced persons for the following teaching posts :—

(1) LECTURER, to teach Electrical Engineering to O.N.C. courses and subsequently the subjects Electro-Technology and Electrical Machines to H.N.C. standard. Ref. No. BTC 61/18.

(2) ASSISTANT GRADE B to teach Electrical subjects of City and Guilds courses for Electrical Technicians and Electrical Installation students. Ref. No. BTC 61/19.

Burnham Technical Scale salaries :—

Lecturer, £1,370 to £1,550
Grade B, £700 to £1,150

with degree or equivalent and training allowances where applicable.

Placing on scale dependent upon approved industrial and teaching experience.

Details and application forms, returnable as soon as possible, from Registrar, Bristol Technical College, Ashley Down, Bristol, 7.

Please quote ref. no. of post when applying.

718

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment at WEST THURROCK GENERATING STATION (Grays, Essex).

ASSISTANT MAINTENANCE
ENGINEER (Mechanical).

Salary N.J.B. Class M, Grade 8, Scale 13, £1,440-£1,610 per annum, plus London weighting £60 per annum.

Applicants should preferably have served an apprenticeship and have technical qualifications leading to corporate membership of one of the major engineering institutions.

Previous experience in generating station maintenance is essential.

Applications, quoting reference S.V. No. 1481, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., by 29th April, 1961.

715

PAISLEY TECHNICAL COLLEGE

George Street, Paisley

Scottish Central Institution

Electrical Engineering Department

APPLICATIONS are invited from Honours Graduates with industrial experience for appointments as lecturers in (a) ELECTRIC POWER ENGINEERING and (b) ELECTRONIC ENGINEERING. The commencing salary will depend upon experience subsequent to graduation and will increase by £50 per annum to a maximum of £1,700 per annum.

Courses are provided in the Department for the London External B.Sc. Degree and the I.E.E. Part III examinations.

Further particulars may be obtained from the undersigned and applications should be submitted not later than 15th May, 1961.

H. N. HENRY,
Paisley Technical College. Principal.

735

HASTINGS EDUCATION COMMITTEE

Hastings College of Further Education
Archery Road, St. Leonards-on-Sea

REQUIRED for 1st September, 1961:—

Full-time LECTURER in Electrical Engineering to teach Electronics and Electrical Technology to H.N.C. Level. Ability to teach some Physics would be an advantage. A Degree or corporate membership of the I.E.E. or (Brit.) I.R.E. essential. Salary £1,370-£1,550; commencing salary dependent on qualifications and approved industrial and/or teaching experience.

Further particulars and forms of application (to be returned within 14 days) obtainable from the Principal. 731

LONDON ELECTRICITY BOARD

Assistant Distribution Engineer

APPLICATIONS are invited for the above position at 18/24, Lower Clapton Road, London, E.5.

Applicants should have a sound technical education to the standard of the Higher National Certificate and possess practical experience in all branches of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class J, Grade 11, £1,015 per annum rising to £1,140 per annum, inclusive of London allowance.

Applications stating age, qualifications and experience should be sent direct to the Manager, Northern District, 18/24, Lower Clapton Road, London, E.5, to reach him within fourteen days of the publication date of this notice. Please quote ref. PER/V/3257/R. 719

SOUTH OF SCOTLAND ELECTRICITY BOARD

Fife Area

Second Assistant Engineer, Construction

APPLICATIONS are invited for this post at Area Headquarters, Dunfermline. Applicants should have practical experience of construction of lines and substations up to 33 kV and preferably hold technical certificates leading to Corporate Membership of the I.E.E.

Conditions of employment in accordance with N.J.B. Agreement; present classification and grade J.7 (Scale 11); present salary £1,275 to £1,410 per annum; post superannuable subject to satisfactory evidence of health.

Applications on standard form, obtainable from Area Manager, S.S.E.B., East Port, Dunfermline, should be returned not later than Wednesday, 3rd May, 1961. 747

J. & P.

TRAINEE SALES ENGINEER REQUIRED IN SHEFFIELD

JOHNSON & PHILLIPS Ltd. have a vacancy in their Sheffield branch for a Trainee Sales Engineer and invite applications from ambitious young men with H.N.C. in Electrical Engineering. The successful applicant will in due course handle the selling of Capacitors, Switchgear and Transformers.

J. & P. are one of the leading companies in the industry with factories and selling organisations in this country and throughout the Commonwealth.

Applications giving details of training, etc., should be addressed to the Employment Manager, Johnson & Phillips Ltd., Charlton, London, S.E.7.

755

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

ASSISTANT MECHANICAL MAINTENANCE ENGINEER, MARCHWOOD GENERATING STATION (SEC/3.146). The duties will include the detailed planning of major plant overhauls together with the organisation and supervision of manual staff.

Preference will be given to those possessing qualifications leading to Corporate Membership of an appropriate professional engineering institution or equivalent qualifications. Applicants should have had experience in the maintenance of generating and auxiliary plant associated with a modern station.

Salary N.J.B. L.9, Scale 11, £1,275-£1,410.

Special application forms obtainable only from Divisional Secretary, 111, High Street, Portsmouth, should be returned by Tuesday, 2nd May, 1961. 757

***Situations Vacant** (continued)*

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS are invited for the following superannuable N.J.B. Schedule A appointments :—

PLANNING ENGINEER,
USKMOUTH "B" POWER STATION,
WEST NASH, Nr. NEWPORT, MON.
(Vacancy No. 77/ER/61).

Salary Class K, Grade 7, Scale 12, £1,350-£1,500 per annum.

Applicants should possess H.N.C. or equivalent qualifications and have had experience of organising heavy maintenance work. The successful applicant will be responsible to the Deputy Station Superintendent for the planning of all overhaul and preventive maintenance.

The appointment offers ample scope for initiative and experience to the right person.

MAINTENANCE ENGINEER (Mechanical),
UPPER BOAT POWER STATION,
Nr. PONTYPRIDD, GLAM.
(Vacancy No. 78/ER/61).

Salary Class H, Grade 6, Scale 11, £1,275-£1,410 per annum.

Applicants should have had experience of power station maintenance and preferably be Corporate Members of the Institution of Mechanical Engineers or hold equivalent qualifications.

Special application forms obtainable from Divisional Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 6th May, 1961. 758

ELECTRICAL ENGINEER

required for mechanical engineering company who manufacture capital plant for the paper and corrugated board industries. Applicants should possess a Higher National Certificate, have served an apprenticeship, preferably with an electrical manufacturer, and have some practical experience of control gear and rotating machines. The successful candidate, whom we expect to be aged between 24 and 30 years, will join a small department which is responsible for specialised electric drives and control equipment supplied with our products.

Written applications to Masson Scott & Co. Ltd., Riverside Road, Summerstown, London, S.W.17.

702

EASTERN ELECTRICITY BOARD

Northmet Sub-Area

TWO THIRD ASSISTANT ENGINEERS, ST. ALBANS DISTRICT (Ref. 1052) (79/61.R). Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems, including sub-stations.

Salary N.J.B. Class G, Grade 9 (£965-£1,090).

Apply by letter to F. J. Drake, Assoc.I.E.E., Manager, Eastern Electricity Board, St. Albans District, 107, St. Peter's Street, St. Albans, Herts., by 5th May, 1961. 759

DRAUGHTSMEN

required in long-established and progressive company. Permanent and progressive position offered to men holding O.N.C. or equivalent who are used to producing a high standard of work and with experience in design layout and detailing in either of the following fields :—

A.C. AND D.C. ELECTRICAL MACHINES.
MOTOR CONTROL GEAR AND PANELS.

Details of qualifications and experience should be sent to the General Manager, Newton Brothers (Derby) Ltd., Alfreton Road, Derby.

749

SITE ELECTRICAL ENGINEER

required to supervise the erection of contactor gear, control gear, distribution gear, control panels, desks, etc., for use with equipment being installed on steelworks contracts.

The applicant should be familiar with the reading of D.C. and A.C. automatic control schemes and liaising with cabling contractors, and also assisting with the commissioning of the electrical equipment.

Applications to—Box 723.

JOURNEYMAN ELECTRICIAN

with A.C. and D.C. experience for Maintenance Department of COTTON TEXTILE FACTORY operating under British management in UGANDA. Five-year contract, 4 months' home leave after 3/3½ years, passages paid out and home, bachelor or married accommodation at reasonable rentals, pension scheme.

Reply with particulars of age, family responsibilities, qualifications and experience to—Box 625.

BUCKINGHAMSHIRE EDUCATION COMMITTEE

Wolverton College of Further Education
(Principal: K. W. B. Sharp, B.Sc.)

ASSISTANT GRADE B required in the ELECTRICAL ENGINEERING DEPARTMENT to teach Electrical Installation Work and National Certificate Subjects, duties to commence 1st September, 1961. Candidates should have industrial and teaching experience.

Salary scale £700 to £1,150 per annum, with additions for qualifications and increments on the scale for approved experience.

Further particulars and forms of application may be obtained from the Principal, College of Further Education, Wolverton, Bucks, to whom completed forms should be returned as soon as possible. 730

ENGINEERING TECHNICAL WRITERS

INTERESTING posts available in London for men with sound knowledge of one or more branches of engineering and experience of technical writing.

Full details to—Box 721.

ELECTRICAL ENGINEER

JUNIOR DESIGNER required for D.C. and A.C. electrical machines. H.N.C. or equivalent. Aged 23 to 27 years. Salary according to experience.

Full details of qualifications and experience should be sent to the General Manager, Newton Brothers (Derby) Ltd., Alfreton Road, Derby.

748

DESIGNER/DRAUGHTSMAN

for Consulting Engineers' Office near Five Ways, Birmingham, to undertake design, layout of electrical services for hospitals, industrial and commercial buildings. Excellent working conditions, pension scheme.

Apply in writing for application form to—Box 684.

FOREMAN ARMATURE WINDER

required by leading London electrical repairs organisation.—Box 661.

ARMATURE winders required, conversant A.C.-D.C. industrial repairs, by Browning's Electric Co. Ltd., Boleyn Castle, Green Street, Upton Park, London, E.13 (Grangewood 4003). 753

ASSISTANT branch managers, salesmen, storekeepers and trainees required by Superlamp Ltd., electrical wholesalers, at their head office and branches in the Home Counties. Reply in confidence to—Managing Director, Superlamp Ltd., 72/76, Eversholt St., London, N.W.1. 703

ASSISTANT engineer required by consulting engineers in their head office. Experience required in design and contract work of tower and wood pole lines. Applications stating age, qualifications, experience and salary required to—Kennedy & Donkin, 12, Caxton Street, London, S.W.1, quoting ref. JGW/HSJ. 750

ASSISTANT engineer required for wood pole line contracts in Scotland. — Ref. J.H.P., B. French Limited, Kidderminster. 590

CABLE estimator required. State age and experience.—Wandleside Cable Works Ltd., 106, Garratt Lane, Wandsworth, London, S.W.18. 514

CLERICAL assistant reqrd. for Blackfriars and Gravesend offices. Knowledge of electrical trade desirable. Progressive position. —London Electrical Co., 92, Blackfriars Road, London, S.E.1. 680

CLERK of works for mechanical and electrical engineering services installations contracts at Topsham Barracks, Exeter, rebuilding programme. The appointment will be for a period of approx. two years commencing from September, 1961. A similar appointment is to be made for Seaton Barracks, Plymouth, for a period of approximately two years from May, 1962. Forms of application available from—Hoare, Lea & Partners, Consulting Engineers, 5, Headland Park, Plymouth. 722

CONSULTING electrical engineers require a young assistant holding at least H.N.C. to join their senior engineer in Tehran after a period of training in London. Duties in connection with small generation and distribution systems, switchgear and protection. Two-year contract. Brief details should accompany request for application forms, obtainable from—Kennedy & Donkin, Alliance House, 12, Caxton Street, London, S.W.1, quoting reference RAV/E. 724

CONSULTING engineers require intermediate design-draughtsman for electrical services. Excellent promotion prospects in expanding practice. Write—Locke & Beal, 303/307 Balham High Road, London, S.W.17. 608

COST and accounts clerk required by well-known electrical contractors in N.W. Lond. area. Must be fully expd. Reply stating age, sal. req. House available to suitable applicant.—Box 681.

DESIGNER required for L.T. switch and fusegear. Apply by letter giving details of experience and salary required to—Wm. Sanders & Co. (Wednesbury) Ltd., Ridding Lane, Wednesbury, Staffs. 751

DRAUGHTSMEN required in S.E. London for interesting and varied work on public telephone exchanges and radio equipment design. Workshop experience desirable. Minimum of O.N.C. (electrical) an advantage. Good salaries and permanent prospects. Apply Staff Officer (ref. 736/84), Associated Electrical Industries Limited, London, S.E.18. 708

ELECTRICAL contractors, old-established, require expd. clerk able to prepare final invoices from materials and wages books, etc. Excl. sal. to suitable applicant. Pension scheme and housing available. Write stating age, exp. and sal. expected. — J. W. Russell Ltd., 18, Queens Road, Watford. 682

ELECTRICIANS, good all round, to work on own initiative, lighting and power, screwed pyro., P.V.C., etc. Over rate. North London.—Box 8230.

ENFIELD-STANDARD POWER CABLES require foremen experienced installation high-voltage cables, large contracts. Apply—Contracts Manager, E.-S.P.C., Stockingswater Lane, Brimsdown, Middx. 587

ENGINEER representative required for London and Home Counties by electrical manufacturing and repair organisation. Please write giving full details of career to date.—Box 752.

ESTABLISHED progressive electric heating appliance manufacturer requires first-class senior sales representative to call on electrical wholesalers in the London area. Man of considerable experience and connection required for this highly remunerative position. Car provided. Write full details in confidence to—Box 609.

ESTIMATING/supervising and/or design and also junior engineer required for progressive positions for high-class installation work in an expanding company. Write in confidence stating age, experience and salary required to—Alliance Electrical, 2, Henrietta St., London, W.C.2. Progressive salary with possibility of a non-contributory pension and free life assurance. 118

GENERAL foreman required for wood pole line contracts in Scotland. — Ref. J.H.P., B. French Limited, Kidderminster. 589

HEATING-electrical sales engineer required for Greater London to contact architects, municipal engineers and contractors. Older man preferred.—Box 685.

FOREMAN electrician required for large factory in London area to supervise maintenance of H.V. and M.V. motors up to 600 h.p., H.V. and M.V. switchgear and lighting. Applicants should be preferably of O.N.C. standard and capable of supervising industrial installation work. Permanent post, staff pension scheme, financial assistance for house purchase if required. Write, stating age, qualifications, experience and salary required, to—Box 704.

INVOICE clerk, male, required for cable contractors, Central London. Good salary and prospects.—Box 725.

LIGHTING engineer/planner required by leading lighting fittings manufacturer, capable of preparing interior lighting, designing, estimating, surveying, etc. Age 22-28; salary depending on age and experience.—Box 686.

OPPORTUNITY for keen man about 30 to take charge of sales office of old-established London firm in lighting industry. Experience in lighting fittings. Sales activities desirable but not essential. Applicants must have good knowledge of the electrical trade and be accustomed to dealing with users, contractors, architects, etc. Good prospects for keen organiser, 5-day week, pension fund. Write fully to Box 509, stating age, experience and salary range.

SALES representative required, having live, well-established connection with contractors, wholesalers, architects, etc., for London and Midland areas, by manufacturers of electrical wiring accessories. State age and extent of connection. Existing staff have been advised of this advertisement.—Box 705.

SALES representative required in connection with high class specialised rotating electrical machines. Reply, stating age, experience, qualifications, etc., to the Managing Director, W. Mackie & Co. Ltd., 129/133, Lambeth Road, London, S.E.1. 665

SENIOR and junior electrical design engineers/draughtsmen required for consulting engineers' office. 5-day week, luncheon vouchers, Spring and Summer holidays. Applicants for senior positions must be experienced in design of electrical services for modern hospitals, universities, factories, etc. Please apply stating age, experience and salary required to—J. Stinton Jones & Partners, 21, Gloucester Place, London, W.1. 142

SUPERVISING electrical engineer for electrical contractors' London office able to prepare schemes and estimates and carry through to account stage. Progressive, pensionable situation. Write—W. J. Furse & Co. (London) Ltd., 22, Alie Street, Aldgate, London, E.1. 666

SUPERVISING engineer, experienced, required by expanding firm of electrical contractors N.W. London. Progressive position. Pension scheme. Write stating age and experience to—Box 196.

SUPERVISING engineer. Must be experienced estimator in all types of commercial and industrial electrical installations. Write full details of training and experience to the Manager, F. H. Wheeler & Co. Ltd., Regal Buildings, Oxford Road, Manchester, 1. 8231

SURVEYOR required for wood pole line contracts in Scotland.—Ref. J.H.P., B. French Limited, Kidderminster. 588

TECHNICAL manager required for West London electrical equipment manufacturing company. Experienced knowledge of circuit breakers and control gear required, with awareness of the requirements of flameproof equipment. Applications are invited from qualified electrical engineers for this senior appointment, with age not exceeding 45 years. The appointment is pensionable and applicants are requested to submit full details of technical qualifications, experience and training, etc., to — Managing Director, c/o Box 532.

TEST engineer required by well-established company in the South of England for their current and power transformer test depts. Applicants should have O.N.C. or similar qualifications. Write with particulars of education, experience and salary required to—Box 571.

TRANSFORMER development engineer to be responsible for impulse testing and other interesting development work in an expanding organisation. Good salary and prospects for suitable applicant. Reply in confidence, stating age, experience and qualifications. —Box 627.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

SENIOR ELECTRICAL ENGINEER
wishes change. Can introduce new business. Design, estimate, supervise, etc., from enquiry to accounts.
Reply—Box 7703.

COMPLETELY mobile bachelor, London, of good education and appearance with seven years' auditing and accountancy and twenty-two years' electrical experience (4 installations, 2 site cable supervision, 3 outside expediting, balance —all aspects material control) seeks travelling post in equipment expediting, auditing and/or control, liaison duties or equivalent. Good salary and conditions. Please write—Box 7714a.

EXPERIENCED linesman desires situation on overseas contracts. Recently completed 6½ years abroad.—Box 7710.

REPRESENTATIVE, able to sell. Reply only if reasonable opportunity of £1,500 p.a. income.—Box 7704.

REPRESENTATIVE / manager / buyer, 18 years' comprehensive experience electrical trade, seeks change.—Box 8232.

SALES BY AUCTION

Forty-fourth Sale.

E R

By Order of the Secretary of State for Air.
N. 25 MAINTENANCE UNIT
ROYAL AIR FORCE
HARTLEBURY, WORCESTERSHIRE
(4 miles from Kidderminster, 11 miles from Worcester)
NOCK & JOSELAND
are instructed to sell by Auction
at the above Unit on
THURSDAY, 4th MAY, 1961
at 11 a.m. prompt
A Large Quantity of
VALUABLE MISCELLANEOUS STORES
including

Clothing and Equipment, Footwear, Dinghies, Parachutes, Cameras and Photographic Equipment, RADIO and ELECTRICAL EQUIPMENT, General Stores.

VIEWING:—The Lots are on View at Hartlebury on Tuesday and Wednesday, 2nd and 3rd May, 1961, between the hours of 9 a.m. and 4 p.m., and on the morning of the Sale Day between the hours of 8 a.m. and 11 a.m.

Admission only on production of Catalogue, which will admit two persons on the View Days and one person on the Sale Day. The Secretary of State for Air reserves the right to refuse admission. Catalogues, price ONE SHILLING EACH (Postal Orders NOT Stamps), can be obtained from the Auctioneers:—

NOCK & JOSELAND
Bank Buildings, Kidderminster
(Tel. 2053 and 4211) 667

ARTICLES FOR SALE

HOUSE SERVICE METERS

200-240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.
221, City Road, London, E.C.1 37

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd. London W4. 57

A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish, vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

ALTERNATORS FOR SALE

kW	r.p.m.		
130	600/720	380/3/50/60	Unused
132 (2)	720	380/3/60	do.
346	600	415/3/50	do.
310	750	do.	do.
208	750	440/3/50	do.
110 (4)	600	do.	do.
225 (3)	600	3.3/6.6 kV	do.
620 (3)	750	3.3 kV	do.
kVA			
136	1000	440/3/50	Rebuilt
57	1000	380/3/50	do.
56.5 (2)	1500	400/3/50	do.
55	600	do.	do.
50 (6)	1500	do.	Unused
50	1000	do.	Rebuilt

More than 150 alternators in stock.
Low prices for prompt clearance.
FYFE, WILSON & CO. LTD.
Station Works, Bishop's Stortford, Herts.
(Tel. B.S. 1000/1/2)
754

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 55/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 2234/5/6). 169

A.C. and D.C. slotmeters and quarterlies. Reconditioned, guaranteed 2 years. Repairs and recalibrations.—Victor Electric Co., South View, Sweet Hill, Patcham, Brighton, Sussex. London agents, phone Downland 4682 (Surrey). 5001

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

ALTERNATORS for sale from 1,100 kVA at 750 r.p.m. down to ½ kVA. Single and three-phase. All voltages. More than 150 machines in stock. Automatic regulators and switchboards available.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS and generators, all types up to 150 kW.—Powerco Ltd., 312, York Road, London, S.W.18 (VAN. 5234). 151

AN electrical tunnel kiln for tile burning complete with ancillary equipment. Suitable for operation on 400 volt, 3-phase, 50 cycle A.C. mains. Built by G.E.C. Ltd., England. Available at Jinja, Uganda. In good condition. Full particulars obtainable from the Crown Agents, 4, Millbank, London, S.W.1 (Ref. W10/SALES 1925). 734

BARGAINS in electric motors from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Ring Monarch 3355. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 170/-. See Quarterly.—Tradex, Surbiton. 170

CABLE for sale. 52,500 yds. 19/052 PBJ cable on drums of 1,500 yds. each in new condition. 22,500 yds. 10 s.w.g. PBJ cable on drums of 1,500 yds. each in new condition.—J. Lowenstein & Co. Ltd., 24-28, Cheapside, London, E.C.2. 629

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists. — Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT-breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards. — Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONDENSERS, 250 mfd., 240 v. A.C., for power factor correction, £9 10s. Autotransformers, 230/115 v., 300 watts, 50s. Plating units, 250 amps., 12 v., £80.—Kingston Electrical, 134, London Road, Kingston-on-Thames (KIN. 7534). 7711

CONVERTERS, motor-alternators, motor-generators, frequency changers, etc. All types up to 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

Articles for Sale (continued)

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, " Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

FLUORESCENT tubes reconditioned and guaranteed with a life as new from 7s. 6d. each. Free collection and delivery in Lancs and Yorks. Save 40% on your tube replacement costs by using this service. We are also manufacturers of top quality fluorescent fittings, trunking systems, control gear and new fluorescent tubes. Generous discounts available.—Anglo-American Electrical Company, Clive Street, Bury (Telephone, Bolton 27251). 212

FOR sale, good unused and used machinery including electric motors, A.C. and D.C. dynamos, alternators, transformers, diesel and steam electric generating sets, mains failure sets, motor generator and Ward Leonard sets, switchgear, compressors, fans, capacitors, etc.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford, Herts (Tel. B.S. 1000/1). 161

GENERATING sets, portable or stationary, new and reconditioned, 1 to 100 kW, A.C. and D.C. — Powerco Ltd., 312, York Road, London, S.W.18 (VAN. 5234). 148

INSULATING varnish, clear, Minerva No. 720, £10 per 40-gal. drum.—Lowton Metals Ltd., Sandy Lane, Lowton St. Mary's, Leigh, Lancs. (Tel. 71441/2). 93

KARDEX, Roneodex and Shannovue cabinets, as new.—F. H. Jolly & Co. Ltd., 289, King St., London, W.6 (RIV. 5381). 202

LAURENCE Scott alternator, 125 kVA, 440/3/50, slow speed, 375 r.p.m. Complete with exciter. Mounted on bedplate. Switchboard. In excellent condition. £395.—Speed Electrics, Dept. ER., Church Street, Basford, Nottingham (Tel. 75716). 573

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTORS and control gear, huge stocks all types, ¼ to 200 h.p.—Ramsbottom & Co. Ltd., Elec. Engineers, Keighley (5444/7). 70

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. and D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switchholder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

QUARTERLY credit meters, single and polyphase, 2½-100 amps. From 20/-. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 34

SMALL BR screws and nuts in steel, brass and stainless steel, from stock. — Premier Screw & Repetition Co. Ltd., Woodgate, Leicester. 180

SOAG paper drilling machine in excellent condition. Cost new approximately £240; will sell for £150. Please telephone Mr. P. C. Davie, WATerloo 3484. 7712

WESTINGHOUSE static single to 3-phase converter complete and as new. Serial P.1552. Offers to—London Dial Company, 113, Regent's Park Road, London, N.W.1. 706

TELEVISION slotmeters and time switches. Details from: Tradex Meter Co., Surbiton (Elmbridge 2234/5/6). 172

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generating sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

.06 sq. in. P.I.L.C.S.W.A. & S. cable, 4-core, 660-volt grade, 14s. 6d. per yard, 50-yd. lengths and under; 14s. per yard all lengths over 50 yards. 6,000 yards available on 500-yd. drums. Brand new. Special discount for quantities.—C. M. Hartshorne & Co. Ltd., Meltham, Nr. Huddersfield (Tel. Meltham 537). 516

5-ft. fluorescent fittings, 200 baton 15s. each; 150 trough type 20s. each; all in excellent condition.—C. M. Hartshorne & Co. Ltd., Meltham, Nr. Huddersfield (Tel. Meltham 537). 517

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

500-kW, 220-volt Met.-Vick. rotary converter, with transformer, 11,000 volts, 3-phase, 50 cycles, and accessories.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 17

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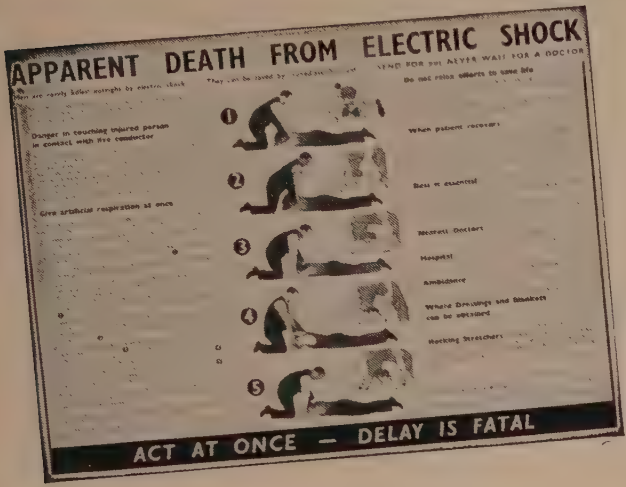

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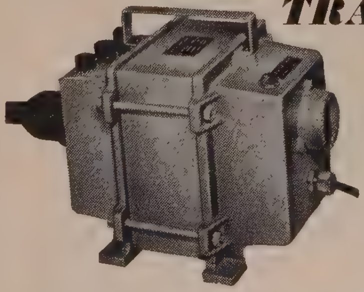

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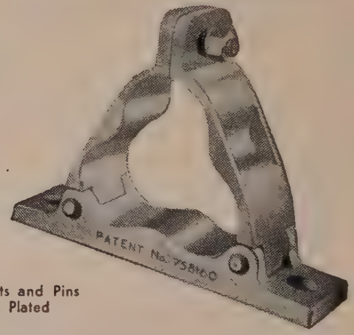

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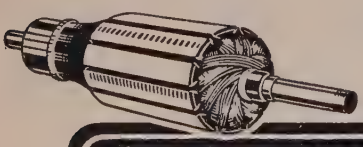

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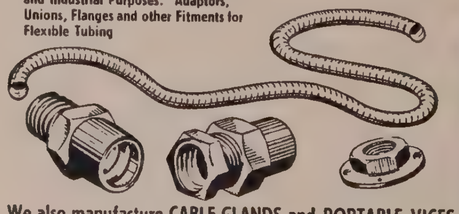

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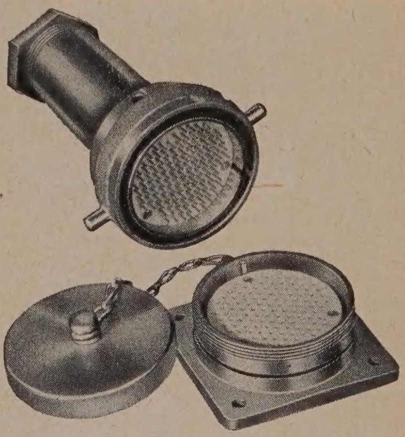

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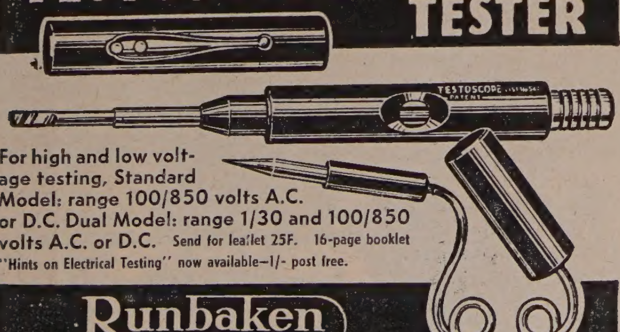

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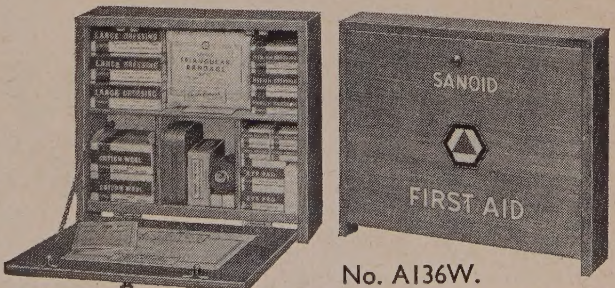

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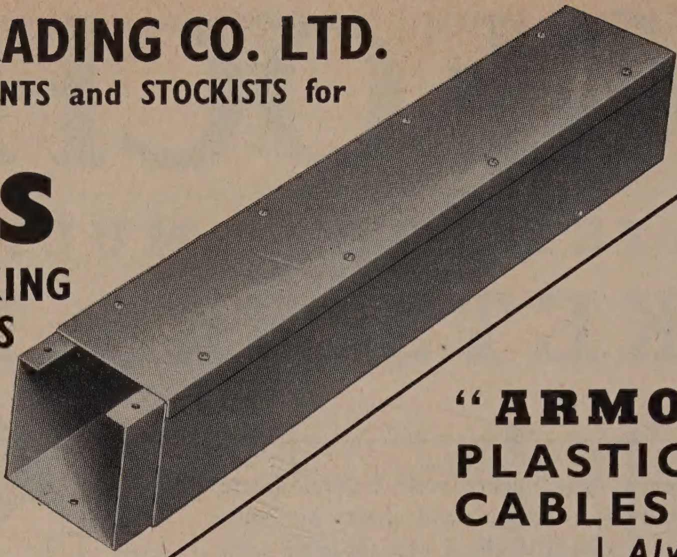

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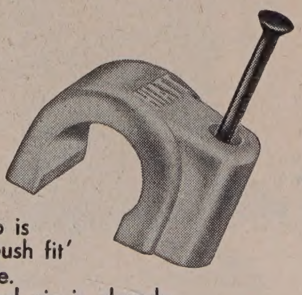

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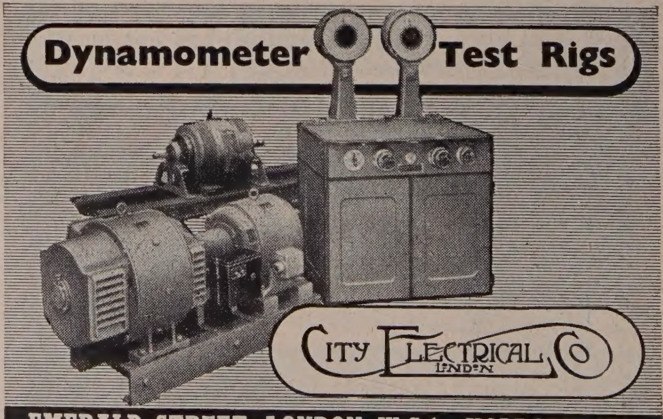

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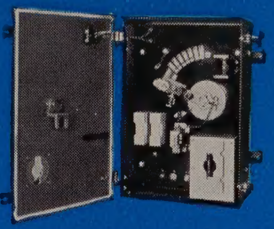

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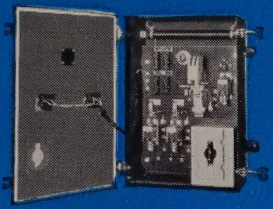

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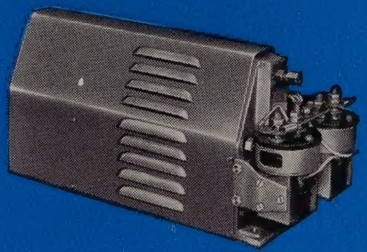

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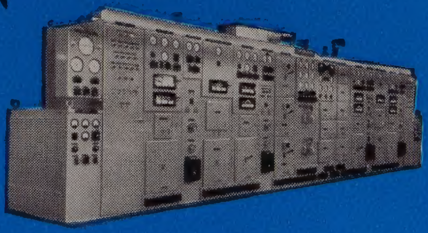

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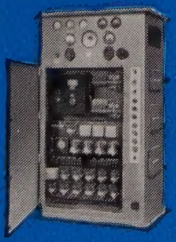

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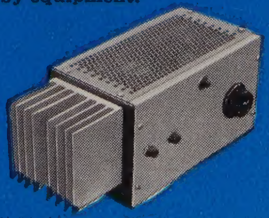

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4 out of 5 women prefer a bulb whose whiter light is kinder to the eyes

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This may be an advertisement, but it's certainly no pipe-dream that "4 out of 5 women, given a choice, prefer the Mazda NETABULB". So say the Market Research men who did the counting in a recent independent survey.

A.E.I. LAMP & LIGHTING CO. LTD
Head Office: Melton Road, Leicester

AEI
Lamp and Lighting Co Ltd

Mazda lamps stay brighter longer